

HARVARD STUDIES
IN
CLASSICAL PHILOLOGY

*EDITED BY A COMMITTEE OF THE CLASSICAL
INSTRUCTORS OF HARVARD UNIVERSITY*

VOLUME XXII

1911



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PREFATORY NOTE

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LUCRETIANA

NOTES ON BOOKS I AND II OF THE *De Rerum Natura*

BY J. S. REID

I, 28. In the famous introduction to the first book, Lucretius presents Venus in two aspects, first, as the source of all life, then as the authoress of peace, which she alone can win by the spell she has the power to cast over the god of war. In this eulogy of peace notes are struck whose sub-tones are to be caught by the attentive ear throughout the poem. Of all schools of ancient thought, the Epicurean alone was untouched by the glamour of war. Cicero makes it a reproach to the disciples of Epicurus that their discourses were not embellished by references to the warriors of old. And Lucretius is the one Roman poet whose soul is wholly unstirred by the martial history of his own country. After the poet has claimed the inspiration of Venus for the verses which he dedicates to Memmius, a favorite of the goddess, there comes a line (28) which forms a sentence by itself: *quo magis aeternum da dictis, diua, leporem*. As it stands, this line means 'because of the favor with which you look upon my patron, be all the more ready to bestow an undying charm on my lines.' A slight change would give the passage a deeper significance in relation to the whole tone of the poem. Lucretius may have written *des*, and intended the verse to form part of the following sentence. 'Bring about peace over sea and land, that thou mayest the more readily impart an unfading brilliance to my verse.' In vv. 40 sq. the poet again insists on the importance of peace for the success of what he writes.

I, 66 sq. In this celebrated passage about superstition it is said that a *Graius homo* (Epicurus) was the first who dared boldly to confront her dread form. A great exaggeration; but the false claim to have been the first or the only man to have performed some intellectual feat is common in ancient literature. In V, 336, Lucretius asserts that he himself *primus cum primis* clothed Epicurean doctrine in a Latin garb.

The phrase *cum primis*, as used by him, has lost its literal sense, and means 'particularly,' 'especially,' as in I, 130 and 716; II, 536 and 849; V, 336 and 621; VI, 225 and 260. It therefore appears to intensify rather than to modify *primus*. But it is certain that some at least of the prose Epicurean writings in Latin, on which Cicero repeatedly pours contempt, must have been of earlier date than the poem of Lucretius; see my edition of the *Academica*, p. 21. Albucius, whom Lucilius ridiculed (Cic. *Fin.* I, 8), had certainly written on Epicureanism (Cic. *N. D.* I, 8). He may have used Greek, but Fronto (ed. Nab. 111) appears to rank him as a Latin poet. Manilius, in his opening passage, makes a boast like that of Lucretius, probably with more justice. Horace boldly ignores Catullus and other earlier writers of Latin lyrics. In I, 117, Lucretius backs the pretensions of Ennius, who was similarly blind to the existence of Naevius. Timon, the Sceptic, addressed his master Pyrrho in words which closely resemble those which Lucretius uses of Epicurus here and elsewhere (Sext. *Emp. A. M.* I, 305):

μοῦνος δ' ἀνθρώποισι θεοῦ τρόπον ἡγεμονεύεις
ὃς περὶ πᾶσαν ἑλὼν γαῖαν ἀναστρέφεται
δεικνὺς εὐτόρνον σφαίρας περικαύτορα κύκλον.

I, 70. *inritat animi uirtutem*. In *C. I. L.* I, 1009 (VI, 10,096) we have *decoraat*, probably a perfect. Buecheler quotes in illustration Mart. *Cap.* IX, 998, *farcinat immiscuit*. In his note, Munro speaks of *superat et* in V, 396 (making *superat* a perfect), as a certain conjecture of Lachmann. I venture to doubt its certainty. The mss. give there *ignis enim superauit et ambens multa perussit*; but the *Quadratus* (Q) has a correction *lambens*, which editors in general have accepted, with Lachmann's *superat et*. Munro truly says that *ambens* has no existence, whether as participle of *ambedo* or *ambio*. But the uncorrected reading of O Q is perfectly tolerable, with the change of one letter, *ambiens* for *ambens*. The dissyllabic *ambiens* is no more difficult than the trisyllabic *abiete*, *pariete*. Three imitators of Lucretius use *ambire* when speaking of fire: Verg. *Aen.* VI, 550; Min. Fel. *Oct.* 35; Arnob. *adv.* g. II, 30; compare, too, Sen. *N. Q.* V, 13, 3.

I, 71 sq. One of Seneca's not very frequent imitations of Lucretius echoes this passage: *cogitatio nostra caeli munimenta perrupit* (*Dial.* VIII, 5, 6).

I, 103. *desciscere* of revolt against philosophic doctrine, in Cic. *Acad.* II, 46; Sen. *Dial.* VIII, 2, 1. So *deficis* in relation to an Epicurean in Cic. *Fam.* VII, 12, and *transfugis* in Sen. *Dial.* VIII, 1, 4.

I, 112 sq. This passage, which presents the opinions of Ennius touching the soul's destiny after death, is difficult. The disembodied spirit does not wing its way to murky Orcus, but animates some other living body (ll. 115, 116). Yet the *Acherusia templa* do exist, *quo neque permaneant animae neque corpora nostra, sed quaedam simulacra modis pallentia miris* (ll. 122, 123). If the soul is immediately reëmbodied, how can there be these *simulacra*? Nor does it appear that Acheron is a place where the souls have to linger awhile before their fresh incarnation. Homer's had passed into a peacock, and then into the body of Ennius. Yet Ennius in his vision is faced by the shade of Homer. It seems that Ennius had in some way managed to combine two inconsistent pictures of the world beyond death; one, that drawn by Homer himself, in which are seen feeble phantoms, with souls whose force is attenuated by their severance from the bodily frame; the other that which was painted by Pythagoras. The reading *permaneant*, declared by Goebel, Brieger, Giussani, and others to be impossible, suits excellently the first of these discordant imaginations. The construction *quo . . . permaneant* has been illustrated by Lachmann and Munro; I may add Lucan, VII, 478: *Olympi . . . quo nulla tonitrua durant*. It is strange that *permanent* should find champions: 'as if *corpora* could *permanare*' (Housman, in *Classical Review*, XV, 367).

I, 136-145. It occurred to me many years ago that these lines should come after v. 79. Giussani makes the same suggestion.

I, 145. *conuisere*. This rare verb is found in *C. I. L.* VI, 27, 383 (Buecheler, *Carm. Epigr.* 1061), where we have also *uolta*, the unusual form which Lucretius took over from Ennius (IV, 1213).

I, 159. An argument closely resembling that of Lucretius occurs in Sext. Emp. *P. H.* III, 18.

I, 165-8. These lines (*nec fructus . . . consistere certa*) seem to be out of place. If they were put after v. 173 we should have a much more logical arrangement of topics. The lines 159-164 along with 169-173 then develop the argument that the region of the world, whether earth, sky, or sea, in which each thing can be produced, is determined by law. Then in 169-173 fixity in respect of species is

asserted; in 174 sq. fixity in relation to the season of production. In 172 *ex omnibus* = *ex o. mundi partibus*; in 174 *certis in rebus* = *c. in regionibus*. The words *inde . . . ubi* in 170, 171 must refer to sea, earth, and sky as mentioned in 161, 2.

I, 184. *Nec porro augendis rebus spatio foret usus | seminis ad coitum, si e nilo crescere possent.* Giussani's interpretation of *seminis ad coitum* 'per il successivo aggiungersi di altri primordia' is highly artificial and indeed, looking to the Latin, impossible. All recent students of Lucretius are in debt to Giussani, but his note here illustrates a weakness of his, that of reading extraneous matter into the Latin. It is true, as he says, that a strict judgment of the words *seminis ad coitum* makes them superfluous, if, as Munro supposes, *ad* = *post*. But there are many scores of passages in Lucretius which are open to the same kind of criticism, and elsewhere Giussani himself repeatedly notes the tendency of the poet to redundancy of expression.

I, 190. *quorum nil fieri manifestumst omnia quando | paulatim crescunt, ut par est, semine certo | crescentesque genus seruant.* Giussani makes a feeble defence of the monstrous solecism involved in the *crescentes* of the MSS.; viz., that Lucretius was driven to it because the metre prevented him from writing *crescentia*, and *crescentes* may be referred to *res* understood from *rebus*, six lines earlier. Very many years ago (in lecture) I proposed to read *crescunt atque*, a very simple correction, which was put forward later by an Italian scholar, Nencini, though he afterwards withdrew it in favor of another conjecture. The solecism presented by the MSS. is opposite in kind to that found in Varro, *R. R.* I, 1, 11, *circumcisis rebus, quae non arbitror pertinere ad agriculturam*, which Keil thinks possible in Varro and illustrates.

I, 219. *nulla ui foret usus.* This construction is rare after the time of the comic dramatists. Schoell, in *Archiv f. lat. Lex.* II, 207 sq., passes this example by, but quotes others. One of these is false, for in Cic. *Att.* IX, 6, 3 (in a quotation), *usus est* is a verb. And in Liv. XXX, 41, 8, *consuli* is probably corrupt for *consul*; it may be noticed that Livy obviously avoids the ablative in I, 56, 3, writing *ubi* for the more natural *quibus*. Here probably *nullam uim* should be read. In 184 above we have the ablative, in the only other passages (two) the accusative. The ablative must be regarded as questionable in Lucretius.

I, 229. *unde mare ingenui fontes externaque longe | flumina suppeditant? unde aether sidera pascit?* Munro, followed by others, makes *mare* the object of *suppeditant*, saying that 'sense and context imperiously require it.' A questionable dictum. If *suppeditant* be intransitive, we may compare V, 261, *umore nouo mare flumina fontes | semper abundare et latices manare perennis*. The word *externa* has not unnaturally been a stumbling block to many scholars, and *perennis* in the line just quoted confirms Wakefield's suspicion that Lucretius wrote *aeterna*. These two words are often confused in MSS. elsewhere. Though the poet believed that the order of our world is doomed to ruin, yet he could still write *aeternam lampada mundi* (V, 402) and *aeterni sidera mundi* (V, 514) and could pray to Venus that his verses might never die. The word *longe* cannot be right. To some it may seem natural and even exquisite that Lucretius should contrast the 'home springs' of the ocean with 'the foreign rivers afar'; to me this contra-position seems insipid to a degree. The correction of Bernays, *large*, is supported by I, 1030, and the word would easily be altered to suit *externa*. As to the active *suppeditant*, the sense required here has no real parallel; for the instances adduced by Munro are insufficient. I need not argue about Lucr. II, 568 and 1162; a glance at the passages is enough. In the latter place (*vix aruis suppeditati*) the reading has been questioned by many scholars, and Munro himself hesitated to make *aruis* ablative, as well he might. The third quotation is from Cicero, *In Cat.* II, 25: *omissis his rebus quibus nos suppeditamur, eget ille*, and is even more open to attack. The *res* are immediately defined as the senate, the *equites*, the city, the treasury, the revenues, all Italy, every province, foreign peoples. A catalogue more unfitted to the ordinary sense of *suppeditamur* cannot be conceived. The word, of course, crept into the text at an early date, as it is quoted by Arusianus Messius in the fourth century. And a gloss in *Corp. Gloss.* II, 192, 46: *suppeditamus: χορηγούμεθα* probably referred to this passage; for *suppeditamur* is needed in its text. In Cic. *l. l.* the word appears to be a marginal explanation which has expelled the right expression, perhaps *adiuuamur*.

I, 271-6. O Q have *cortus* at the end of 271 and *pontus* at the end of 276. In the *Itali*, *portus* was written for *cortus*, and Lachmann wrote *uentus* for *pontus*. Both changes have been accepted by Munro.

Many corrections have been proposed for *cortus* from the time of Marullus who suggested *pontum*. Giussani has taken *corpus* from Brieger, but the lashing of the human body by the wind ranges ill with the wrecking of ships, the scattering of clouds, the overthrow of trees, and the battering of mountains. And *corpus* by itself for the body comes in here most awkwardly. The reference to II, 460 is useless. The mention of *portus*, for all the editors have said, is equally out of place. It is possible that the true word in 271 became illegible in the archetype and is now beyond recovery. But I long ago suggested that the corruptions may be due to the interchange of the endings of the two lines; *pontum* when transferred to 276 would at once become *pontus*. This suggestion, I now find, is made by Merrill in his note.

I, 320. *sed quae corpora decedant in tempore quoque | inuida praecluserit speciem natura uidendi*. Munro takes *natura uidendi* together, comparing (with Conington) *natura medendi* in Persius V, 101, to which may be added Lucan, X, 271, *natura latendi*. But, however appropriate the turn of expression may be to these late stylists, it is unlike Lucretius, though of course in him, as in Cicero, *natura* with the genitive of a substantive is often a mere periphrasis for the nominative of the substantive. See Cic. *Fin.* V, 33; Munro on Lucr. II, 646. Further, the construction *speciem quae corpora decedant* is most harsh. Giussani adduces such brevities as *tenerascere mentem confugient* in III, 765. Idly, for his plea that *species* is a *nomen actionis* and so comparable in syntax with a verb, is fallacious. The only way of defending *speciem* would be to make it mean 'power of vision,' as Giussani also has proposed; but no exact parallel can be found. Otherwise *uidendi* could be treated as a genitive of 'further definition' or 'equivalence.' Of many emendations, Lachmann's *spatium* remains the most attractive. In support might be quoted what looks like an imitation in Ovid, *Tristia*, II, 531, *inuida me spatium natura cohercuit arto*. Ovid does not often imitate Lucretius, but in *Fasti*, IV, 94, he has the rare word *initus*, probably from I, 6, and in *Her.* XIX (XX), 110 (if the line be his), *ipso nubendi tempore* from I, 98.

I, 356. Giussani misses the common generic use of *quod* = 'which sort of thing' and writes *quae*. Other neuter pronouns are frequent with the same generic significance.

I, 360. *nam si tantundemst in lanae glomere, quantum . . .* On account of the quantity *glomere*, I have been in the habit of recommending to my pupils a neglected conjecture of Quicherat, *lanae in glomeramine*. It has been recently put forward independently by Garrod in *Journal of Phil.*, 1908.

I, 398. *quapropter, quamvis causando multa moreris*. It is usual to take *multa* with *causando*; but V, 91, *plura moremur*, and VI, 245, *plura morabor*, seem to indicate that it goes with *moreris*. Cf. also Lucan, II, 642, *plura moror*, and III, 79, *vincendo plura*.

I, 405. *intectas fronde quietes*: the unique sense given here to *quietes* seems copied from the similar use of ἀνάπνευλα.

I, 441. Lucretius is, so far as I know, the only Latin writer who employs *fungi* to render the philosophical term πάσχειν as opposed to ποιεῖν (probably first so contrasted by Plato in his *Theaetetus*).

I, 442. *aut erit ut possint in eo res esse gerique*. Munro's interpretation of *possunt* (the reading of O Q), *aut debebit esse tale in quali possunt res esse gerique* appears to be not a little unnatural. It is not borne out by any of his references, in all of which *ut* replaces some part of *qualis* in a quite simple manner. Certainly II, 901, *conciliantur ita ut debent animalia gigni*, is not comparable.

I, 454. *tactus corporibus cunctis intactus inani*. Lachmann first condemned this line because a nominative of a noun formed like *intactus* is impossible. Of course *intactu*, twice used by Sallust, is regular. Against this dictum Brieger quoted Livy, XLII, 12, 7, *per incultum et negligentiam*, and this has been thought by Giussani, Postgate, and others to prove the genuineness of the line. The inference is unsound. There is no more warrant for *intactus* or *incultum*, than for *noncurantia* which the mss. foist on Cicero in *Ad Qu. Fr.* II, 7 (9), 1. Livy is notoriously fond of treating a neuter adjective as the equivalent of an abstract noun, and of employing passive participles as substantives. The phrase *per incultum* is of the same order as *per commodum* in XLII, 18, 3, and *in tranquillum* in III, 40, 11. And there is little or nothing in the argument of Giussani that no forger could have constructed a line so cognate in meaning to the doctrine of Epicurus and Lucretius. The contrast between *tactus* and *intactus* is involved in the whole context. Postgate says that this line proves datives to have been in the text of the preceding verse; but *saxis* alone would be quite

sufficient for the marginal annotator. So far as syntax goes the datives and the genitives accord equally well with the usage of Lucretius, and can be obtained by equally small departures from the readings of O Q. But to use the worthless line 454 in order to establish in 453 the abnormal dative *aquai* is not good criticism. To obviate this objection Postgate reads *liquor aquae stat*. He refers to I, 747, *nec pausam stare fragori*, which is dissimilar. Arnob. I, 8 (*euenta naturae*), echoes l. 467.

I, 469, 470. *namque aliut terris, aliut regionibus ipsis | euentum dici poterit quodcumque erit actum*. Whatever may be the true reading of this much debated passage, it seems clear that Lucretius meant to set land and people over against each other. Yet anything that occurred during the Trojan war might equally well be called an *euentum* of both. The contrast, therefore, is merely formal, and either point of view applies equally well to the whole argument of 459-483, which concerns the nature of time. But possibly *aliut . . . aliut* is corrupt for *aliter . . . aliter*. What Brieger means by saying that Munro conjectured *Teucris* for *terris* 'miro errore,' I do not know. His own *saeclis* can hardly stand for 'the people' by itself, even though we have *saecla hominum* two lines above. Wakefield's *legionibus* for *regionibus* (leaving *terris*) is better; but the word itself seems unlikely. Perhaps some word like *bellantibus* has been extruded from the text. In 467 the syntax of *abstulerit* is worth notice, though it has generally been passed over. Brieger calls it subjunctive in a quotation from an imagined opponent. Apparently he took *quando* as temporal. But the opponent would be putting forward something that makes against himself. And *erit actum* in 470 is not easy ('shall have been done,' Munro); *abstulerit* cannot be parallel to *erit*, as it should be. If 469, 470 were placed before 467, 468 and *erat* read for *erit*, all would be in order, *quando* being causal. Then *abstulerit* would be substituted for *abstulit* under the influence of *dici poterit*.

I, 476. Munro and many others have taken *clam* here with *Troianis*, as preposition, and the *Thesaurus* quotes the passage as evidence for the construction. The improbability of this prepositional use of *clam* in Lucretius is very great. The one example given from Cicero rests on a bad conjecture (*Att.* X, 12 A, 2); and the one from Caesar, *B. C.* II, 32, 8, is discredited both by the badness of the text of the 'Civil

War' and by the occurrence in Caesar of *clam* as an adverb in fourteen other passages. Nor can *Bell. Afr.* 11, 4 count for much. If *Troianis* be taken as dative, there are plenty of parallels in Lucretius.

I, 489 sq. Compare a fragment of Epicurus περὶ φύσεως in Scott's *Fragmenta Herculanensia*, p. 55: ἰσχυρὰ περαιοῦν διὰ τῶν τοίχων καὶ τῶν λοιπῶν συγκρουόντων στερεμνίων. τοῦτο δ' αὐταὶ αἱ αἰσθήσεις ἐπιμαρτυροῦσιν.

I, 491. *dissiliuntque fero feruenti saxa uapore*. So O Q; editors generally write *feruentia*. Although Lucretius frequently, in archaic fashion, puts together two epithets without connecting conjunction (see Munro on II, 118), he would hardly join adjective and participle together in this way. I would keep *feruenti* and read the Lucretian *fere* for *fero*, as has been several times proposed.

I, 492. *rigor auri*. This is not 'the stiffness of gold,' as commentators take it, but 'the frosty nature of gold.' The phrase thus leads up to the bold expression *glacies aeris* in the next line. The line in V, 764, *menstrua dum rigidas coni perlabitur umbras* (sc. *luna*) has been similarly misunderstood. There *rigidas* is not, as Munro has it, 'well-defined' (a strange word to express the idea), but 'cold,' 'frosty.' Compare I, 355, *rigidum frigus*; V, 640; VI, 307; Lucan, III, 401, *et gelidas alte submotis solibus umbras*.

I, 517. The expression *inane rerum* has been questioned without cause. In Verg. *G.* I, 416, *ingenium et fato rerum prudentia maior*, the word *rerum* has been usually taken with *prudentia*, but it rather goes with *fato*, 'the destiny interwoven with the world.' We have here one of the many Stoic echoes which are to be found in the Vergilian poetry. The famous phrase in *Aen.* I, 126, *sunt lacrimae rerum*, 'tears are at the heart of things,' is similar. A little like is the common attachment of *rerum* or *omnium rerum* or sometimes *omnium* (neut.) to a noun, to give the greatest possible extension to its meaning. See my note on Cic. *Acad.* II, 146. Fronto even joins *omnium rerum* in this way to an adjective (*sanus o. r.*, ed. Nab., p. 24, l. 16). The much debated lines in Catullus, XLVII, *Porci et Socraton duae sinistrae | Pisonis, scabies famesque mundi* (so it is in the Verona ms.) exhibit a parallel generalizing use of *mundi*, with which we may compare the Irish form 'ye thief of the world,' and such expressions as τὰς ἐξ ἀνθρώπων πληγὰς in Demosthenes. Not very unlike is *mundi* in

Lucan, VIII, 335, *transfuga mundi*, over which scholars have made much difficulty.

I, 541. *res quaeque* is here plural, but singular in 536. Perhaps *redissent* has been changed from *redisset* owing to the neighborhood of *forent*.

I, 554, 5. *ut nil ex illis a certo tempore posset | conceptum summum aetatis peruadere finis*. So O Q, except that Q has *fine* and *finem* as a correction. The reading has been changed in many ways by editors. A protest must be made against *ad summum* in the impossible sense of 'at last' (like *ad extremum*, *ad ultimum*, *ad postremum*) which Giussani adopts from Brieger. And *aetatis peruadere finis* could hardly be said by Lucretius in the sense 'to arrive at the full complement of life'; to say nothing of the dubious syntax. In favor of Munro's *ad auctum* for *finis* may be quoted Sen. *Suas.* I, 3, *quidquid ad summum peruenit, incremento non reliquit locum*; Sen. *Ep.* LXXIX, 8, *cum ad summum perueneris, non est incremento locus*; *Dial.* II, 5, 4, *ad summum perducta incrementi non habet locum*. The suggestion that the end of life, and not merely its culmination, should be mentioned here, is rather hypercritical. If I may add to the already numerous conjectures, I would propose *ad summum . . . limen*, comparing *uitae limen* in III, 681, and *leti limen* in II, 960; VI, 1157 and 1208; and *extrema ad limina* in V, 485.

I, 565 sq. Munro's acute change of *possint* into *possit*, so that *possit reddi* stands impersonally for *possit ratio reddi*, seems to be absolutely confirmed by *non poterit ratio reddi* in 572. But Brieger dismisses the emendation with a contemptuous *male*, and Giussani follows. The order of the words which Munro assumes can be easily paralleled from Lucretius. As Duff, in *Class. Rev.* XIII, 170, accepts Giussani's explanation of *possint*, it is worth while to examine it. He first interprets *reddi* as equivalent to *rationem reddi*, but fails to give the grammar of *possint omnia rationem reddi*. He merely proves, what no one doubts, that *reddere* can stand for *rationem reddere*. Then he states that because *reddere* means 'spiegare,' therefore it can take a personal construction in the passive, 'aided by the vicinity of *omnia*.' Exactly why this follows is not very easy to see, but let that pass. He then takes *possint omnia reddi* as meaning 'all things can be explained.' Because *reddere* can sometimes, in certain contexts, have the sense 'to

explain,' therefore *possint reddi* can have the sense *here* of 'can be explained.' We have an admirable example of the critical miracle which may be wrought by a trick of translation.

I, 570. *at contra si mollia sint primordia rerum*. There is, I think, in Lucretius no other line whose rhythm halts in exactly this manner; for IV, 493 is somewhat different. Perhaps *mollia* is out of place and should come before *rerum*.

I, 598. *naturam mores uictum motusque parentum*. The collocation seems to show that *motus* is here to be taken as equivalent to *motus animi*; so in Cic. *Acad.* II, 139; *De Div.* II, 111; *Tusc.* V, 114.

I, 599 sq. The theory of Epicurus concerning the ἐλάχιστα or *minimae partes* within the atom is notoriously difficult, and too intricate to be discussed at length here. Giussani's examination of it is a marvel of imaginative insight, but I cannot refrain from expressing my conviction that he has left most of the stumbling blocks just where they were. He tells us much of what Epicurus might have said or ought to have said, but very little of all this can be fairly extracted from the ancient texts. I can only definitely mention here Giussani's treatment of the term ὄγκος, which appears not only in the passage of the letter to Herodotus dealing with the doctrine of the *minimae partes*, but in two other sections of the letter. That ὄγκος and ἄτομος are not at all convertible terms is clear, though Brieger asserted that it is so in § 59 of the letter. Asclepiades, the unorthodox Epicurean physician whom Galen often criticises, seems to have contrasted the two terms (Usener's *Epicurea*, § 382). But there is no proof of Giussani's contention that in a visible object the ἄκρον or *cacumen*, the least part within the range of vision, is the ὄγκος or molecule of modern science, the smallest part of the object which retains the character of the whole. In this connection Giussani does not refer to an important passage, *Lucr.* IV, 110 sq. It is there stated that living creatures exist so small that if any one of them were cut into three portions, no one of these portions would be visible to the eye. If vision fails to stretch to the point at which organic tissue begins to dissolve into atoms, what likelihood is there that it could reach to the corresponding point in matter of inorganic nature? Giussani, like many other investigators of the ancient philosophy, starts with the false modern assumption that a writer of repute cannot have overlooked any

inconsistency or illogicality which is apparent to a critic of our day, who inherits an instinct developed by long ages of debate.

I, 612. *non ex illorum conuentu conciliata.* As *minimae partes* precedes, *illorum* has been generally changed to *illarum*; but the transition to a neuter has many parallels in Latin; see my note on *Cic. Acad.* II, 43.

I, 655. *id quoque*: the neuter pronoun calls attention to what follows and is in apposition to the sentence. The usage is commoner with *hoc* and *illud* than with *id*. The principle is the same when the sentence which is in apposition precedes, as in *Cic. Fam.* VII, 32, 3, and *Att.* II, 9, 1, where the usage is unjustly questioned by editors. Substantially a verb is omitted, to which *id* would be subject, such as *fit*; just as *hoc ubi* in *Verg. G.* II, 312, stands for *hoc ubi fit*. The editors there give no parallels; but we may compare *Quintil.* VI, 4, 10; X, 7, 23, and XI, 1, 76, where *hoc* stands for *hoc fit* or *feri potest*. So, too, *haec ubi* in *Sen. Dial.* VI, 20, 2.

I, 657. *sed quia multa sibi cernunt contraria muse* (O) or *mu* (Q). Many have been the corrections. Two late MSS. and some scholars wrote *mussant*, 'without sense,' says Munro; but the Vergilian use of *mussare* and Lucretius himself in VI, 1179, justify the meaning 'they are shy of saying it.' Perhaps, however, Lucretius wrote the intransitive *mutant*, 'they change their ground'; then a stop should be placed at *purum*.

I, 675-9. Here in 675 *corpora* is 'atoms,' but in 678 it is the equivalent of *res*. The awkwardness of this is avoided if we suppose that Lucretius wrote *mutatoque ordine mutant naturam res ut* (not *et*) *conuertunt corpora sese*. The confusion of *ut* and *et* in MSS. is very frequent. In l. 806 Priscian has preserved the true reading *ut* for *et*.

I, 743. *res mollis rarasque relinquunt | aera solem ignem terras animalia fruges.* Because the four elements *aer aqua terra uapores* are given as *molli* in l. 567, Christ and others read *rorem* for *solem*. But the addition of *animalia* and *fruges* here and the fact that *terras* not *terram* is used, indicate that Lucretius was not thinking of the four elements merely. The passage is like 820, 821: *eadem caelum mare terras flumina solem | constituunt, eadem fruges arbusta animantis*. So, too, in 853, *ignis umor aura* are joined with *sanguen* and *ossa*. Giusani reads *rorem* in 744, but passes by *aurique* and *aurum* in 839, 840,

where Bentley demanded *auraeque* and *aura*, in order to complete the mention of the four elements.

I, 758. The MSS. have at the end of 758 *habes*, corrected in O to *habebis*. Perhaps *habeto* is right; cf. II, 465.

I, 759. O Q have *uene* at the end of the line, corrected since Wakefield into *ueneno*, a very questionable predicative dative. I have found it only in Varro, *R. R.* I, 2, 18, where it is probably not right, as *uenum* occurs immediately after. Plin. *N. H.* XVI, 79, obviously avoids it, as he writes *uenenum est*, but *remedio est*. It is safer to write *uenenum* here.

I, 831 sq. In relation to the discussion here of Anaxagoras, I take the opportunity of referring to a passage of Cicero concerning that philosopher, which has brought down on the writer oburgation from the prejudiced, while the more charitable have suggested corruption of the text. The passage is part of a rapid summary of the physical doctrines of Greek thinkers and runs thus: *Anaxagoras materiam infinitam, sed ex ea particulas similis inter se minutas, eas primum confusas postea in ordinem adductas a mente diuina* (*Acad.* II, 118). I am far from wishing to speak evil of H. Diels, whose services to the cause of learning have been splendid and have been universally recognized, but I must say that in his *Doxographi Graeci* he has criticised Cicero as an exponent of ancient philosophy, in a spirit of unreasoning hostility. Curiously enough, the attack is largely directed against Cicero's Latin, and is couched in Latin which is not only harsh, but sometimes seriously incorrect. The only charge which is precisely formulated concerns the words quoted above, on which Diels says: *turpiter labitur interpres, nisi emendando succurrere uolueris*. Zeller, a model of candor at all times, suggests that Cicero wrote *dissimilibus*, and he quotes Augustine, *C. D.* VIII, 2, in support. But the word *dissimilibus* is twice a correction there for *similibus*, and is not the original reading. The chapter concerns what Augustine calls the Italic and the Ionic schools of philosophy and mentions only a few philosophers, including Anaxagoras and Archelaus. What he writes about Anaxagoras is incomplete in the MSS., but the relevant words are *ex infinita materia, quae constaret ex similibus inter se particulis*. And of Archelaus: *de particulis inter se similibus . . . putauit constare omnia*. It is easy to demonstrate that in this part of his work Augustine is not using Cicero

as a source. Probably Varro was his authority, and spoke of Anaxagoras much as Cicero did. Zeller and Diels both seem to construe Cicero's words as though he had written *in ea* not *ex ea*. He is not regarding primarily the original confusion of the σπέρματα, but their arrangement by νοῦς in groups. The words *eas primum confusas* are merely parenthetic. [It is true that Cicero omits in his brief summary what Lucretius calls the *latitandi copia tenuis* as a secondary matter.] It is natural therefore that he should dwell on the similarity of the individual σπέρματα when grouped, and not on the dissimilarity of the groups. Of a similar incompleteness in a statement of Simplicius, Diels, with more charity than he uses towards Cicero, remarks *minus accurate, quamquam non falso*. The addition of *diuina* to *mente* is of course erroneous, but this misconception seems to have been general in Cicero's time and after. There is a curious passage in Pseudo-Quintil. *Decl.* 233, which probably refers to Anaxagoras: *attenderes physicis: quaereres utrumne ignis esset initium, an uero minutis editus et mirabilibus elementis perpetuus hic mundus an mortalis esset*. For *mirabilibus* Roehde suggested *mutabilibus* and Ritter followed; but the sense is not good. Perhaps the right reading is *similibus*.

I, 858. *at neque reccidere ad nilum res posse neque autem | crescere de nilo testor res ante probatas*. The use of *res* = 'facts,' after *res*, 'objects,' is awkward, but insufficient to condemn the line, which has been repeatedly questioned. The brevity of the expression, for *testor ut credas reccidere* is like III, 766, where *confugient* is followed by an infinitive, something like *ad id ut dicant* being omitted. The similar form *adducor ut sit* for *a. ut credam esse* is found in V, 1341, and is not uncommon; it is illustrated by Madvig on Cic. *Fin.* I, 14, where instances of an infinitive instead of an *ut*-clause are given. See also Krebs-Schmalz, *Antibarbarus*, s. v. *adduco*, and add Cic. *Diu.* I, 35; Livy, II, 18, 6; IV, 49, 10; VI, 42, 6. Madvig quotes the fuller form from Cic. *Att.* XI, 7, 3, *me adduxeris ut existimem*, followed by infinitive; see also *Fam.* II, 10, 1; *N. D.* II, 17; *Lael.* 59; *Parad.* 14; *Phil.* I, 33 and VIII, 30. Quite as harsh a brevity occurs in Lucr. II, 1128, *fluere . . . manus dandum est*; and in Ovid, *Fast.* V, 74, *hinc tangor maiores tribuisse uocabula Maio*; and in Hor. *Sat.* I, 4, 115, *sapiens uitatu quidque petitu sit melius causas reddet*; and in *Aetna*, 372, *atque hanc materiam penitus discurrere fontes | infectae rumpuntur aquae radice sub ipsa*.

I, 866. *ossibus et nervis sanieque et sanguine mixta*. So O Q; editors are divided between *mixto* of late MSS. and *mixtim* of Politian. But *mixtim* is dubious in the literary Latin of this time; in III, 566, it may not be the right correction for *mixti*. Postgate, in *Journal of Philology*, XXIV, 133, well defends *sanieque*, which has been questioned. [A much stranger passage is in Lucan, II, 657: *eliso uentre per ora eiectat saniem permixtus uiscere sanguis*.] In the context we have two passages beginning with *praeterea* and both referring to the *corpora* to which the earth gives birth. The difficulties which they involve may be overcome, if we suppose in 870 the word *item* in *transfer item* to be an error for *enim*, and *praeterea* in 873 to have sprung from an original *propterea*, by assimilation to *praeterea* in 859 and 867. It will then be unnecessary to suppose a gap between 873 and 874. In the latter line, possibly *quae lignis cumque oriuntur*, is the true lection, *cumque* having dropped out because it occurs in the preceding line. Munro has *lignis his*; but Lucretius would hardly speak of 'these woods,' when *all* woods are referred to above. The burning of *ligna* is regarded here; but *breaking* in 891.

I, 881-890. A number of questions have been raised, and more may still be raised, about these lines.

(1) In 882, 3: *mittere signum | sanguinis aut aliquid nostro quae corpore aluntur*. If a genitive had existed which would replace *aliquid* and supply a regular antecedent to *quae*, it would doubtless have been suggested by scholars and accepted. The change from *aliquid* to *quae* is harsh; but it has parallels both in Greek and in Latin. The neuter plural has a generalizing effect: *quae* = 'all such things as.' Doubt has been cast on *corpore aluntur*, 'grow within the body,' but needlessly. Compare Varro, *R. R.* II, 5, 14: *bestiolae . . . quae sub cauda aluntur*.

(2) Ll. 884, 5 stand in O Q thus: *cum lapidi in lapidem tenemus* (corrected to *terimus* long since) *manare cruorem consimili ratione herbis quoque saepe decebat*. It has been generally supposed (since Howard and Munro proposed it) to be necessary to transpose these two verses. But an examination of Munro's translation will show that, without contravening the poet's usage, the same sense emerges with the MSS. order. Whether the meaning thus obtained is correct may be doubted. It has been assumed that the nutrition of men ceased to be the theme

at the end of 883. In that case it is strange, as Giussani points out, to speak of *herbae* as pounded by stones for the animals, who are obviously thought of as grazing in the fields. It seems probable that the line *cum lapidi in lapidem terimus, manare cruorem* refers to men and not animals, and that a line has been lost in front of it, which made allusion to the grinding in the mill of something besides *fruges*, possibly olives. The sense would be given by some such line as *atque oleas ratione pari persaepe decebat*. Then, reading *herbas* (a change made by Lachmann and some older editors, but not required by the former arrangement), we have a quite natural reference to animals. Giussani's explanation of 881-4, which supposes two grinding operations for *fruges* to be indicated, first a rough pounding and then a finer attrition, is most artificial and awkward. Lachmann cast out the *in* before *lapidem*, but later editors have been right in keeping it, the object being *fruges, oleas*, or *herbas*, not *lapidem*. [Of course, small words like *in* are frequently intruded into MSS. There is an example in l. 882.]

(3) Ll. 885, 6: *et latices dulcis guttas similique sapore | mittere lanigeræ quali sunt ubere lactis*. Giussani calls *laticis* 'antica e sicura correzione.' To me it seems strange that the *herbae* should send forth drops of water (for such must be the meaning) having a taste like that of milk. And clearly, Lucretius meant to contrast the more solid food of graminivorous creatures (*herbae*) with the water they drink. Just so above (864, 5) the *cibus aridus* and the *liquor* are separately considered, and asserted to consist of *alienigena*. This reflection is also good as against Bruno's correction *salices*, eulogized by Postgate and several other scholars. The grammatical construction of the lines (partly dependent on readings) has been disputed. Some editors read *ubera* with Lambinus; but the *ubera lactis* would hardly be said to possess *sapor*. Nor (keeping *ubere*) can *lanigeræ* be plural, for a like reason. With *quali* we must construe *quali (sapore) sunt lanigeræ* (dat.) *guttæ (in) ubere lactis*. But O has *qualis* corrected to *quales*, and Q has *quali*. With the reading *quales*, the construction is much simpler: *quales (guttæ) sunt lanigeræ (in) ubere lactis*. Postgate proposed *qualis dant*, which is no great improvement.

I, 890. *dispertita in terram latitare*: so O Q; editors since Lachmann *inter terram*. But Lucretius may well have written *intus terra*; see the examples quoted by Munro on IV, 1091.

I, 918. *hac ratione tibi pereunt primordia rerum*. This line seems to be out of place, and should come at the end of the paragraph. Ll. 919, 920 become thus more tolerable here.

I, 942. Mss. give *facto* for *pacto* as in 789. It has been somewhere proposed to read *potu*; but *potio* was the only form current at the time. Otherwise we might compare Lucian, *Lexiph.* XX, *δέδοικα γοῦν μὴ πτῶμα γένοιτό μοι τοῦτο τὸ λόγων πῶμα*.

I, 943, 4. *haec ratio plerumque uidetur | tristior esse quibus non est tractata*. It has not been noticed that both *tristior* ('very bitter') and *tractata* ('tasted') carry on the comparison of the argument with a potion. Compare II, 399, *huc accedit uti mellis lactisque liquores | iucundo sensu linguae tractentur in ore*.

I, 945. *vulgus abhorret ab hac [ratione]*. Lucretius always implies that the believers in Epicurus were few. Cicero, on the other hand, repeatedly speaks of the wide diffusion of Epicureanism, even in Italy. See especially Tusc. IV, 6, where two reasons are assigned, (1) that the multitude were allured *illecebris blandae uoluptatis*, (2) that the only philosophical writings in Latin were Epicurean. So, too, *Acad.* I, 25, and *Fin.* II, 44: *nescio quo modo populus cum illis facit*. Cicero's opinion is, of course, in great part due to the classing of the vulgar votaries of pleasure along with the real believers in Epicurus. On the other hand, we find in the *Gnomologion Parisinum* (Usener, *Epicurea*, p. 157) an utterance of Epicurus of which Seneca gave a translation in *Ep.* XXIX, 10: *οὐδέποτε ὠρέχθην τοῖς πολλοῖς ἀρέσκειν· ἃ μὲν ἐκείνοισ ἤρεσκεν οὐκ ἔμαθον· ἃ δ' ἤδειν ἐγὼ μακρὰν ἦν τῆς ἐκείνων αἰσθήσεως*. The last word means 'taste,' not 'understanding,' for Epicurus stoutly maintained that the most ignorant could comprehend the true philosophy. It would seem that the professed adherents of Epicurus were never relatively numerous either in Greek lands or in the West. Seneca, *Ep.* LXXIX, 15, quotes letters of Epicurus and Metrodorus to show that they had no great repute in their time. Lucian, *Hermot.* XVI, indicates that the great majority of professing disciples of philosophy in his time were Stoics.

I, 951, 2. *sed quoniam docui solidissima materiai | corpora perpetuo uolitare inuicta per aeuom*. . . . He has demonstrated the solidity of the atoms and their eternal durability, but not the eternity of their movement which is only introduced in 984 sq. Perhaps he wrote *per-*

petuom, for which cf. V, 161, *fundatum perpetuo aevo*, and below, l. 1004: *perpetuo aevi tractu*.

I, 962. Giussani is surely mistaken in explaining *haec sensus natura* as 'questa speciale sensazione,' 'la sensazione di questa cosa speciale.' No 'cosa speciale' is mentioned anywhere in the context; what is said applies to all things in the universe, and even if any particular thing had been indicated, it is hard to see how there could have been any special form of sensation connected with it. So far as language goes, Giussani deduces his rendering from two usages; the periphrasis (common in Lucretius, Cicero, and other writers) of *natura* with the genitive of a noun for the nominative of the noun; and the use of *haec* for *huius rei*. But these two modes of speaking should not be forced into union in this way. The proceeding is as violent as that of the writer on the staff of one of the Eatanswill journals in the *Pickwick Papers*, who, having to write on Chinese Music, read up articles on China and on Music and "combined his information." Munro's interpretation of *haec sensus natura* as equivalent to *hic sensus noster*, i. e., the human faculty of sensation, is absolutely correct.

I, 977. Munro in ed. IV returned to the mss. reading *efficiatque*, which had been generally altered to *officiatque*. The only example of *efficere quo minus* which I know in literature occurs in Quint. XI, 1, 48. Munro quotes one from the *lex coloniae Genetivae*. But there are a good many analogies, as in Cic. *Fam.* I, 4, 2 (*factum esse*); and III, 7, 6 (*perficies*).

I, 984-1007. Many transpositions have been proposed within the range of these lines. Giussani, following Goebel, placed 998-1001 (*postremo . . . extra*) after 1007, where *postremo* is far less suitable than in the position which Munro assigned to the verses, viz. after 983. Ll. 995-7 are in several ways awkward. If they come rightly after 994 the word *in* (*semper in assiduo motu res quaeque geruntur*) must be a corruption of *enim*; the *enim* is badly needed and the *in* is unusual. Then comes: *partibus e cunctis infernaque suppeditantur | ex infinito cita corpora materiali*. The preposition *e* is not in the mss. Brieger requires *in*; but surely *e cunctis partibus* is good enough: 'in all directions.' These words must go with *geruntur*, because when Lucretius mentions the result of the atoms clashing, he continually speaks of some being driven upwards, without hinting at other directions. So

Epicurus constantly spoke of ὑπερείδοντα. To link *partibus e cunctis* with *infernaque* (or even with *inferneque*) is harsh. For *inferna* of MSS. I, many years ago (in lecture), proposed to read *inferne*, and Postgate has recommended the same change (*Journal of Philology*, XXIV, 133). He refers to VI, 192 and 942, where editors have altered *superna* into *superne*, but not to VI, 764, where *inferne* is necessary for *inferna*. In the other two passages the emendation is not certain. Postgate goes too far when he says that *inferna* is impossible here. It lies well within the range of the common substitution of adjectives for adverbs; so e.g., *postremis* for *postremo* in III, 250; *manifesta* for *manifesto* in I, 855; *rectum per inane* for *recte* in II, 217. The lines 995-7 are a curious anticipation of the doctrine of the *clinamen*, which is not hinted at again until II, 80 sq., and later in II is treated in a very cursory manner. It is first stated in nine lines (216-224). Then there is a digression to refute a supposed doctrine of Democritus (225-242), after which comes a weak repetition of the theory, which never appears again, not even in V, 416-431, where it would be well in place. [Leo, in *Archiv für lat. Lexic.* X, 431, implies that the adjective *infernus* is not Lucretian. But it cannot be altered in V, 647.]

I, 1030. *ut semel*. So in IV, 610. In a note on VI, 634, Munro lays it down that *ut* for *ubi* (evidently meaning the temporal *ubi*) is not Lucretian; but these passages are overlooked. In VI, 550, Munro introduces by conjecture *ut . . . cumque*, with the sense 'wherever.' Of course *ut* = 'where' is classical, though it does not happen to occur in Lucretius. But *utcumque* elsewhere always means 'howsoever' or 'whenever,' not 'wherever.'

I, 1033. *summissaque gens animantum*. Giussani, following Polle, gives a grossly unnatural sense to *summissa*, which I will not criticize. The word is a generally accepted correction for *summa*. But though the earth is naturally said *summittere flores* and the like, the expression is not suited to *gens animantum*; though *primitive* animals and men did literally spring from earth (V, 801 sq.). The MSS. word *summa* must be deeply corrupt, and conceals some expression indicating the renewal or continued life of animals, parallel to the renewal of the fruits of the earth. Perhaps *suppletaque* (*supplere* is Lucretian).

I, 1040. *materies aliqua ratione auersa uia*. So O Q. Editors have either read *uiaque* with Lachmann, or *uiat*, which is in Q as a

correction. Munro's objection that *ratione . . . uiaque* could mean *nothing but* 'by method and system' is not well founded. Giussani, however, is right in pointing out the awkwardness of having to take *auersa* first in a figurative and then in a literal sense. Many commentators take *auersa uiai* together, but no real parallel has been adduced for this strong graecism, though it is accepted by Munro, Giussani, and others. If *aliqua ratione uiai* be construed together we may compare V, 81, *aliqua diuom ratione*. But perhaps *regione* should be received (from the inferior mss.) and *aliquo* be read for *aliqua* 'turned away in some direction from the proper line of its course.' Compare II, 249, *regione uiai declinare*; and I, 958, *nulla regione uiarum*; Verg. *Aen.* IX, 385, *fallitque timor regione uiarum*. In II, 249, there is a gap before *regione*, usually filled by *recta*, but perhaps the equally Lucretian *quoquam* is the missing word. In these passages *regio* has the κατ' ἐξοχὴν sense which attaches at times to many words: 'the right way'; so *locus*, 'the right place,' and *uia*, 'the right road,' as in Cic. *Att.* II, 19, 2 (wrongly changed by many editors).

I, 1057. *in se sistere*: in II, 603, Lucretius implies that earth rests on air, and in V, 534 sq., he tries, in an unsatisfactory manner, to demonstrate how that may be. His doctrine is not much better than the belief of the Russian peasant that the world rests on three fishes, or the Hindoo legend that it is supported by a monstrous elephant, and the elephant by a tortoise. Earth is at rest *in media mundi regione*; but is the *mundus* itself at rest? Nowhere have we any definite statement on the matter. But a good deal is said which implies that the *mundus* has its downward course stayed by the *ictus externi* (1055) or the *plagae extrinsecus* (1042, 1050) which seem always to be conceived as exerting their force in an upward direction. Compare Masson, *Atomic Theory of Lucretius*, p. 151.

I, 1076. *motus quacumque feruntur*. Can *motus* be said *ferri*? Rather *motu* should be read (with Lachmann), the subject of *feruntur* being *pondera*, from *ponderibus*, which immediately precedes. This line in the mss. contains another intrusive *s* (*aequis* for *aeque*).

I, 1105. H. Nettleship, in *Contributions to Latin Lexicography*, p. 600, justified *tonitralia*, which O Q give, as rightly formed from *tonitrum*, found in VI, 164 and 171, and (it may be added) in Seneca. In *Journal of Phil.* XX, 181, he further referred to Priscian, I, p. 210

(Keil), and to Asper in Hagen's *Anecdota Helvetica*, p. 41, 26. I have not noticed any allusion to the gloss: *tonitralis*: βρονταῖος in *Corp. Gloss.* III, 290, 18. The glosses also give *tonitrum*, *tonitra*, and *tonitralis*. But the tendency of the MSS. to write *t* for *p* casts doubt on *tonitralia* here. Compare I, 16 (*tergis* for *pergis*); II, 43 (*tariter* for *pariter*); II, 46 (*tempus* for *pectus*). In III, 438, *opius* for *ocius* has come through the stage of *otius*. So in the Medicean MS. of Cic. *Att.* IV, 1, 1, *potius* has been turned into *tot*. Ribbeck, in his *Prolegomena* to Vergil, quotes examples of this confusion from the earliest MSS. Brieger, in *Philologus*, XXXIII, remarks *caelum quod auido complexu cetera saepsit nullo modo penetrare dici potest*. Why the heaven, as seen from the earth, should not be compared to the inmost recess of a palace or a temple, is not easy to discern; and the quotation from V, 370 (referring to *aether* not *caelum*; cf. II, 1066), has no bearing on the question.

II, 1 sq. To Munro's illustrations of this famous passage may be added some words from the *Gnomologion Vaticanum*, edited by Sternbach in *Wiener Studien*, XI, 199: ὁ αὐτὸς (Πλάτων) ἐρωτηθεὶς τί ὠφέληται ἐκ τῆς φιλοσοφίας, ἔφη· τὸ αὐτὸς ἐν εὐδία ἐστὼς βλέπει τοὺς ἄλλους χειμαζομένους. The only passage in Plato to which this bears any resemblance (and it is slight) is *Rep.* VI, 496 D. Sternbach refers to Wytttenbach on Plut. *Mor.* 97 F.

II, 8, 9. *sed nil dulcius est bene quam munita tenere | edita doctrina sapientum templa serena.*

It has been proposed to take *serena* with *doctrina*; but while *serena uita*, *serenus animus* are natural expressions, *serena doctrina* is not. And the lofty *templa serena* (*templa mentis* in V, 103) which wisdom builds are evidently contrasted with the *mare magnum*. We have then in the text three epithets, *munita*, *edita*, and *serena*, attached (without any connecting link) to *templa*; two of which, *munita* and *edita*, are of almost identical meaning. Though the attachment of two epithets to the one noun is common enough in Lucretius, the extension of the number to three is harsh and unparalleled. Possibly *edita* was a marginal comment on *munita* and has extruded some other words, such as *tutaque*. Munro supposes that Lucretius may have had in mind Aristoph. *Nub.* 1024: ὦ καλλίπυργον σοφίαν ἐπασκῶν, but it is quite as likely that he remembered a line of Empedocles (52 Mull.): θάρσει καὶ τότε δὴ σοφίης ἐπ' ἄκροισι θόαζε.

II, 14. *pectora caeca*. The blindness of ordinary men is a favorite theme of Epicureans; compare ἀβλεψία in Polystratus, edited by Gomperz in *Hermes*, XI, 420 sq., and τὸ παραχῆς ὑπουλον καὶ τυφλὸν in Heracl. Papyr. 26 (Scott, p. 234); also Democritus, *fragm.* 3 and 82 (Mull.). The opposite of *caecum pectus* is *purum pectus* or *purgatum* in V, 18, 43.

II, 16 sq. The suggestion of Reichenhart (*Acta Sem. Erlang.* IV, 457) to read *non uidere* (perfect) is strange; stranger still Giussani's interpretation of *nil aliud sibi naturam latrare*, in which *sibi* is not referred to *naturam*, but to an indefinite subject (*homini*), to whom nature 'barks out' the substance of the clause that follows.

II, 20–36. *Locus uexatissimus*, and yet there are curious things in it which I have not seen brought into notice. In ll. 20, 21, *ergo corpoream ad naturam pauca uidemus | esse opus omnino, quae demant cumque dolorem*, the mention of the *corporea natura* alone after the pointed reference to mind as well as body in the preceding verses, is noticeable. Lucretius seems tacitly to assume the Epicurean dogma, which drew down on the school much animadversion, that even mental pleasure is wholly dependent on the body. Munro and Lachmann place a full stop at *dolorem*. This renders *quae . . . cumque* awkward, as the relative clause should be one of purpose, and the purpose is quite obscured by *cumque*. It is true that Lucretius often capriciously, and it seems sometimes for metrical reasons, substitutes *quicumque* for *qui*, but this example stands apart from the rest, and if *dolorem* ends the sentence, it will be necessary to suppose that *cumque* is erroneous in the MSS. for *cuique*, as it often is. If the sentence is made to end with l. 22 (*delicias quoque uti multas substernere possint*) the harshness of *quae . . . cumque* disappears, for the relative clause becomes descriptive of *pauca*, and is supportable as it stands, though *demunt* would be more natural. But fresh difficulties arise. What is the subject of *possint*? *Pauca*, say Brieger and Giussani. But surely the sense is impossible: 'few things are needed to remove pain and to enable the few things to supply many delights.' This punctuation absolutely requires a change from *possint* to *possis*. We must now consider Munro's exposition of the following lines: *delicias quoque uti substernere possint | gratius interdum neque natura ipsa requirit | si non aurea sunt iuuenum simulacra per aedes*, etc. Here he makes *uti* concessive,

simulacra the subject to *possint*, and *neque* the equivalent of *non*. The painful contortion of the Latin is obvious. Postgate, in *Journal of Phil.* XVI, 126, gets rid of one trouble by reading *possis* for *possint*. Brieger supposed the subject of *possint* to be general = *homines*; improbably. It is incredible that Lucretius should have here written *neque* for *non*, and not a single passage which can be regarded as parallel has been quoted. In old Latin *nec* or *neque* of course often negatives a single word; so Lucretius has in IV, 1217, and V, 839, *neque utrum* or *nec utrum* (if in the latter place Lachmann's emendation be accepted). These are archaisms merely. In VI, 1214, *neque* has not the sense of *non*, but of *ne . . . quidem*, which is common enough in the older Latin and again from Livy onwards; so probably Verg. *Ecl.* III, 102 (though the interpretation is disputed). Catullus, LXIV, 83, rendered *τάφοι ἄταφοι* by *funera nec funera*, giving a slightly new turn to old usage. For *nec* = *non* in other connections Lucil. I, 12 (Müller), and Catullus, XXX, 4, have been quoted, but the context in both passages is incomplete. Postgate supposed this *neque* in 23 to be correlated with *nec* in 34; but there is no natural correspondence between the two, such as we find, for example, between *neque* in III, 730, and *neque* in 738, in spite of the distance between the two. One would have to suppose that, as sometimes happens in prose, when Lucretius wrote *neque* in 23 he had it in mind to introduce another *neque* in the same sentence, but lapsed into anacoluthon. Compare Madvig on Cic. *Fin.*, ed. 3, p. 792. But no example of this anacoluthon found elsewhere is so intolerable.

The word *gratius* is a very weak point in the arrangement accepted by Munro. The Latinity of *delicias substernere gratius* is arresting; but the meaning which it yields is worse. For Lucretius is made flatly to contradict a fundamental ethical dogma of Epicurus, which drew down much animadversion upon him, that luxury cannot enhance pleasure, which culminates when all pain is removed.

In dealing with remedies, we must first dispose of the abnormal *neque*. It cannot be taken here as the equivalent of *ne . . . quidem*, because the meaning will not suit the context. The word must somehow have connected two clauses or sentences. If a stop were placed at *possint*, and the comma removed after *interdum*, and *neque* assumed to be misplaced in the sentence, a good sense would be given: 'nor

does nature herself desire anything pleasanter, even in the absence of luxuries, than the couch on the soft grass near the river, etc.' But although in some out of the way places *neque* 'tertio loco positum' seems to occur, it cannot be safely assigned to Lucretius. It remains to be supposed that *neque* began a new sentence in the original text. Removing the stop at *dolorem*, reading *cuique* and *possit*, and supposing *gratius* to be an error for *gratis*, and making a pause at *interdum*, we obtain a very tolerable meaning, at the cost of two letters which appear in the MSS., and the change of a third. 'Our bodily nature needs but few things for the removal of every man's pain, and also to enable it to supply us with delights, sometimes without price.' The poet thus emphasizes the familiar Epicurean position that positive pleasure springs into existence the moment pain is stilled, and asserts that pleasure is often given by nature without money and without price. Although in V, 1449, *deliciae* refers to the *καλλωπίσματα* of life which nature does not demand as needful, it may well apply here to nature's simple delights, which, according to Epicurus, furnish pleasures as intense as any. The object of *requirit* is *simulacra*, thrown into the succeeding clause.

It has been noticed that the *aurea simulacra* come from the palace of Alcinous in *Odyssey* VII. Other features of the passage are drawn from the same source, the gold and silver of the shining house; the *citharae*, suggested by the harp of Demodocus, and probably the purple bed-clothing in 35 is reminiscent of the *ρήγεια καλὰ πορφύρεα* and *τάπητες* laid down for the couch of Odysseus (*Odys.* VII, 344).

II, 27. *nec domus argento fulget auroque renidet*. Lachmann read *fulgenti* for two reasons: (1) that Lucretius used *fulgēre*, never *fulgēre*; (2) that he did not lengthen the short final syllable before a following vowel. In order to establish these propositions he made insupportable changes in VI, 213 and V, 1149. Brieger favors *fulgenti* because *fulget* is *contra proprietatem sermonis Lucretiani*. That is to say, *argentum* may be said *fulgere*, but a house cannot be said *fulgere argento*; a very fine distinction. Catullus in LXIV, 44, *sedes . . . fulgenti splendent auro atque argento*, may have had Lucretius in his eye. In l. 165 of the same poem Lucretius III, 630, is imitated, as Munro thinks.

II, 34 sq. There are many utterances of this type in the literature of different schools, including the Epicurean. See Stob. *Flor.* V, 28

(Usener, *Epicurea*, 163); Maxim. Tyr. *o.* 21; Porphy. *Ep. ad Marc.* on XXIX; Varro, *Quinquatrus* (Buecheler, 441): *tu medicum te audes dicere cum in eborato lecto ac purpureo peristromo cubare uideas aegrotum et eius prius alium quam τὸλῆν subducere malis?* Compare, too, Sen. *Ep.* XVII, 12, where there is a reminiscence of Lucretius.

II, 42. *subsidiis magnis Epicuri constabilitas.* Munro's *et ecum ui* for *Epicuri* has been widely accepted, and it is certain that Lucretius must, after mentioning the regular infantry (*legiones*) and the reserves (*subsidia*), have also introduced the cavalry. But it may well be doubted whether he would denote the cavalry by *equi*, as we say "horse" for "horsemen." The usage does not seem to be Latin; for such expressions as *tela fugacis equi* (of the Parthian) in Propertius are not sufficiently parallel. Why not *equitum ui*? This is quite as near the MSS. as *et ecum ui* or *et equom ui* and the asyndeton is of course Lucretian. [The form *ecum* or *equom*, over which Giussani hesitates, is Vergilian.]

II, 43. *ornatas armis itastuas tariterque animatas.* So O; this line and 42 are absent from Q. Of course *pariterque* is a certain correction. Munro writes *ornatasque* and *statuas* (verb), but this is very strange after *cum uideas* just before. Ellis, in *Journ. Phil.* XIV, 91, regards *statuas* as noun. But could Lucretius identify the *legiones* with statues and then speak of them as 'spirited alike'? Woltjer ejected *itastuas* as a corrupted gloss on *ornatas* and substituted *pariter*, thus avoiding the necessity of adding *que* to *ornatas*. He is followed by Giussani. [For *pariter pariterque*, cf. III, 457.] But (1) the supposition of *institutas* having been written as a gloss on *ornatas* is highly artificial, and (2) the *uniformity* of the armor ranges insipidly with the unity of spirit in the troops. Some word parallel in meaning with *uideas* is needed; this can hardly be anything but *spectes*. The corruption would be easy; we have seen the confusion of *t* with *p*; and the intrusive *i* before *s* succeeded by a consonant is one of the commonest errors in MSS., due to a development in the Romance languages. So O Q have *inspeculum* for *speculum* in IV, 283, where Lachmann gives illustrations. So, too, in the Medicean MS. of Cic. *Fam.* IX, 2, 1, *exspectarem* is written *exispectarem*. Of course with the reading *spectes*, we must write *ornatasque*. The readiness with which *que* is inserted in or drops out of MSS. is notorious. Compare C. F. W. Mueller's

notes on pp. 35, l. 30, 91, l. 5, and 552, l. 18, of his text of Cicero's *Ad. Fam.*

In the MS. from which O and Q are derived there was an illegible passage after 41. The scribe of Q left room for three lines, and he can hardly have been wrong in supposing that his exemplar had originally three lines in the space. In O, ll. 42, 43 are supplied in ink of different color. Nonius quotes as from Lucr. II a line *feruere cum uideas classem lateque uagari*, which has naturally been placed after 43 by a number of scholars. Lachmann placed it after 46 and his instinct was true, for it is more effective there; but yet the argument drawn from the MSS. in favor of the other position is strong. Munro renders the line 'when you see your fleet swarm forth and spread far and wide.' This sudden and strange introduction of the fleet seems to have generally passed without notice. [The circumstances here are quite different from those in V, 1226-1230.] I have always explained *classem* (so Merrill, apparently) as the old equivalent of *exercitum*. This sense (which survived in connection with the *comitia centuriata*) is attested by grammarians, and occurs here and there in later literature, as Verg. *Aen.* III, 602, and VII, 716, to which Servius wrongly adds II, 30. Commenting on these lines of Vergil, Servius says that *classis* or *classes* was especially applied to cavalry, a fact not without interest in connection with the occasional employment of *classis* as the equivalent of *prima classis* in the centurial organization. It is very likely that Lucretius thought of the cavalry here. This seems to be indicated by the word *uagari*. The commonest term for the evolutions of cavalry is *euagari*, just as *decurrere* is ordinarily applied to the manoeuvres of infantry. Metrical reasons, I need hardly say, frequently led poets to replace a compound by a simple verb. Hence Vergil writes in his picture of the *ludus Troiae* (*Aen.* V, 560): *tres equitum numero turmae ternique uagantur|ductores*. A little below (325) Lucretius similarly writes *cursu* for *decursu*, of infantry, and in the context there *circumuolitant* corresponds to *uagari* here. The blunder of Livy in IV, 34, 6, has often been noted. Finding in an old chronicle that the *classis* had taken part at Fidenae in a battle with the Veientes, he comments on the strange fact that the fleet could have rendered aid in an encounter at the spot. In *Anthol.* I, 115, 3, *O femineam classem*, we have an odd archaism.

II, 54. *omnis cum in tenebris praesertim uita laboret*. Giussani makes much of a supposed want of connection between this line and the preceding passage. But the nexus of thought is plain. Reason alone, not regal or military power, can banish care, and reason is particularly needed because of the dread darkness that besets our life. The gist of the line is repeated and expanded in 59-61.

II, 98, 9. *partim interuallis magnis confulta resultant | partim etiam breuibus spatiis uexantur ab icta*.

The unique word *confulta* has often been questioned. The commonest term in the Epicurean texts to describe the clashing of the atoms is συγκρούειν, rendered by *confligere* in 86. If a passive of the word had been in existence, Lucretius might have written *conflicta* in 98. In 101 he resorts to *conuecta* and in II, 1061 and 1074 to *coniecta*, and might have written *conlisa* (I, 532). Long years ago, when I lectured on Lucretius, I maintained *confulta* in the sense which Munro and Postgate gave to it (see App. to *Select Elegies of Propertius*), viz., 'pressed together.' The possibility of this sense cannot be denied; and Lucretius may have been imitating a Greek term — συνερείδειν. Although I have not met with this compound in Epicurean texts, yet ἐρείδειν and ὑπερείδειν often occur in reference to atoms, and in an Epicurean fragment διερείδεσθαι is used in another connection. So ἐρείδειν and its compounds belong to the Epicurean dialect. For *magnis interuallis* we may compare a curious fragment of Democritus (20 Mull.): αἱ δὲ ἐκ μεγάλων διαστημάτων κινέομεναι τῶν ψυχῶν οὔτε εὐσταθείες εἰσὶ, οὔτε εὐθυμοί.

II, 105. *paucula quae porro magnum per inane uagantur*.

The atoms here indicated are those which go to form the solid substances like rocks and iron. There is not the least difficulty in referring *paucula* to *haec* in 103. The trouble created by some scholars who make the antecedent to *quae* the *fera ferri corpora et cetera de genere horum*, and so scent deep corruption, does not naturally arise from the text. Nor is there anything unintelligible about *paucula*, which will easily bear the meaning 'relatively few,' but surely not (as Bignone says, in *Riv. di filologia*, XXXV, 92) in comparison with the expanse of void (for Lucretius would hardly compare units of substance with the extended *inane*) nor in comparison with the number of atoms outside the *mundus* (Merrill) — a most unnatural collocation — but in

comparison with the atoms which go to form the softer substances and those of laxer texture. Hoerschelmann's *paruola* for *paucula* is surely wrong; the atoms which constitute hard bodies cannot be assumed to be specially small, nor is it in the least degree probable that Lucretius thought (as some scholars assert) of small portions of rock or iron as wandering through the vasty void. Giussani labors to prove that *paucula* means 'widely scattered,' but his only support for that interpretation is a far from easy line at IV, 69, on which I will not comment here. And nothing is gained by Giussani's interpretation; for if the atoms are relatively few, they will be naturally dispersed widely. Giussani, it should be said, imagines that Lucretius composed the line as a variant for 109, but the resemblance between the two verses is but superficial. I long ago proposed to place 105 after 102 and Cartault has made the same suggestion, but there is not very much advantage in the transposition, though it removes the temptation, to which scholars have succumbed, to treat *fera ferri corpora* as antecedent to *quae*. *Paucula* is an archaic word which reappears in later Latin (Seneca and others).

II, 106. *cetera dissiliunt longe longeque recursant.*

Lucretius roughly divides atoms into two classes, those which become loosely connected and form the softer substances, and those which construct bodies with more compact textures. The division is of course insufficient and incorrect, as there must be many gradations. But the incompleteness need not cast suspicion on *cetera*, which has been often emended; Epicurus in the epistle to Herodotus, § 43, speaks exactly as Lucretius does here.

II, 112. The *memoror* of the MSS. for *memoro* was suggested by the late deponent use; see Rönsch, *Itala u. Vulgata*, ed. 2, p. 373; and Corippus, VI, 284.

II, 114, 5. *contemplator enim cum solis lumina cumque | inserti fundunt radii per opaca domorum.*

Munro thought that *cumque* should be taken with *cum*, but the compound *cumcumque* on the pattern of *utcumque* and *quandocumque* and *ubicumque* is unknown. The alternative is to take *cumque* as = *et cum*, a quite common usage (so in IV, 939). Ellis, in *Journ. of Phil.* III, 267, tried to show that *cumque* could generalize a verb (here *fundunt*), but his quotations are merely instances of *quicumque*, with

tnesis, for simple *qui*. The intransitive *fundunt*, for *se fundunt*, is specially strange in face of IV, 375, and Vergil's echo in *Aen.* III, 151. I once thought *inserti* might be a corruption of *intus se*; now I think it more probable that *solis* has come out of *se olim*. For this use of *olim* (in connection with *cum*) see Munro on VI, 148; there are, of course, many parallels. The figure of the motes in the sunbeam, as illustrative of the atoms, has given rise to an odd gloss in one of the collections: *atomus: tenuissimi pulveres qui apparent in radiis solis*.

II, 125–141. Giussani's comment on this passage or rather on the texts of Epicurus which are cognate with it (in his vol. I, pp. 99 sq.) is very interesting, but contains disputable matters. In order to support the view that Epicurus regarded atomic velocities as persistent and unchangeable, he has to give forced interpretations of the epistle to Herodotus, § 61, καὶ μὴν καὶ ἰσοταχεῖς ἀναγκαῖον τὰς ἀτόμους εἶναι ὅταν διὰ τοῦ κενοῦ εἰσφέρωνται μηθενὸς ἀντικόπτοντος· οὔτε γὰρ τὰ βαρέα θᾶπτον οἰσθήσεται τῶν μικρῶν καὶ κούφων, ὅταν γε δὴ μηδὲν ἀπαντᾷ αὐτοῖς· οὔτε τὰ μικρὰ τῶν μεγάλων, πάντα πόρον σύμμετρον ἔχοντα, ὅταν μηθὲν μηδὲ ἐκείνοις ἀντικόπτῃ. The three clauses with ὅταν proclaim loudly that the atomic velocity is diminished after impact. It is impossible to render ὅταν by 'inasmuch as,' and therefore it is useless to refer to the fact that in a *concilium* the moving atoms are in reality moving through void. The point is that they are moving through void *after impact*. To be sure, any diminution and inequality in the speeds of the atoms after clashing is not easy to reconcile with the *requies nulla data principiis*, whether they be free or in combination. But Epicurus probably left unsolved many problems for which his critics have tried to provide him with solutions. [The word εἰσφέρωνται is unsuitable to the movement of atoms within an organized body.]

II, 141 sq. Giussani places after 141 the lines 308–332. With the traditional order we have (1) an illustration of the perpetual motion of the atoms, which are invisible, from the movement of specks of dust in the sunshine which we can see; then (2) arguments to show how great must be the movement of the unseen atoms; then (3) illustrations to throw light on the apparent paradox of an object at rest when all its particles are in rapid motion. Giussani has not made it clear that there is any gain in inverting the order of (2) and (3).

II, 159. *ipsa* (sc. *primordia*) *suis e partibus unum* | *unum in quem coepere locum conixa feruntur*.

Munro reads *una* in 159 'each a unity composed of its parts' (i. e. the *minimae partes*). Giussani hits the mark when he says that if *unum* is left unchanged, *suis e partibus* becomes meaningless. How it can be maintained that *unum* (as some scholars say) will yield the same sense as *una* I do not understand.

II, 168. The line ends in O Q with *reddi* where an indicative is needed; *credunt* and *rentur* (as in I, 151, and VI, 91) are old conjectures. I prefer *reddunt*, in the sense of *reddunt rationem*, as below in 179.

II, 169. *admoderate*. Another of the new words to which the exigencies of metre led Lucretius. It replaces *adcommodate*.

II, 181. *tanta stat praedita culpa*. This is taken from V, 199 by Lachmann as an emendation of *quamquam praedita*. The error may be due to "parablepsy" from *ne-quaquam* above. Postgate, in *Journ. of Phil.* XVI, 127, reads *quanta stat* '=*quod tanta stat*, an idiomatic use which needs no illustration.' But real parallels must be very rare. The nearest I can find are Sall. *Jug.* c. 31, 22, *nam et illis, quantum importunitatis habent, parum est impune male fecisse*; Plaut. *Stich.* 1, 2, 63, *quanta mea sapientia est*, for which we have *pro sapientia* in *Merc.* III, 1, 7, and Ter. *Phorm.* III, 3, 70.

II, 189. *et sursum nitidae fruges arbustaque crescunt*.

As this line comes in the midst of an argument about fire, it has naturally been suspected. Possibly *et* is erroneous for *ut*, and the mention of corn and trees is introduced merely as an illustration. See note on I, 675.

II, 193. *sponte sua facere id sine ui subiecta putandum est*.

It is true, as Postgate says in *Journ. of Phil.* XXIV, 134, that *subiecta* in itself would apply very well to fire. But that its gender could be explained by harking back to *flammarum corpora* in 187, after the interposition of a number of other subjects and constructions, is not to be believed. The generally accepted correction of Lambinus, *sine ui subigente*, really lies pretty near to the MSS., if we remember their tendency to substitute *c* for *g*. So in 493 they have *iucundet tacere* for *iucunde tangere* and in 553, *cauerna* or *caberna* for *guberna*. To attach a preposition to a noun in agreement with a participle is of course not

uncommon, especially in late Latin; compare I, 1101, *inter ruinas corpora soluentes*.

II, 197. *nam quo magis ursimus alte | directa et magna ui multi pressimus aegre*. The mention of *many people together* pushing down the beams into the water seems rather grotesque. Perhaps *multi* is an error for *moliti* and this has led to the change of *recta* to *directa* (which word is dubious on other grounds).

II, 204, 5. *quamquam | pondera quantum in se est deorsum deducere pugnent*.

There is less apparent reason for this subjunctive than for any other in the text of Lucretius, and it is probably wrong. The words *in se est deducere* are an old correction for *inest . . . ducere*. With *deducere* the word *pondera* must be taken as abstract, 'the weights (of flame, etc.) strive to drag them down.' This is clearly wrong, for *pondera* in the context means 'heavy bodies' (in general). The principle, therefore, of Sussemihl's emendation *decedere* is sound, but it is hardly the right word. I should prefer *descendere*. *Ducere* in 207 may be responsible for the corruption.

II, 212. *in terras igitur quoque solis uergitur ardor*.

Here *uergitur* is generally interpreted as 'tends' (so Munro). Rather it means 'is poured out.' For this sense see V, 1105. Plautus, Vergil, and Ovid use *inuergere* with this meaning, and Lucretius is fond of replacing compound by simple verbs. For the transitive use of *uergere* in other senses, see Neue-Wagener, III, 101. Possibly *uersa* in the phrase *in aera uersa* (V, 279) is the participle of *uergo*, not *uerto*.

II, 218 sq. The examination by Giussani (I, 125 sq.) of the Epicurean *clinamen* is full of interest, but obscure in not a few places, and assailable at a good many points. I can only refer here to a criticism of Cic. *Fin.* I, 19, where Giussani thinks the writer has been negligent and incorrect (p. 149). But Cicero there presents nothing that was not common talk about the *παρέγκλισις*. It was condemned as capricious; in swerving, the atoms follow no general rule; some swerve while others continue their course. This is *dare prouincias atomis* as Cicero also says in *Fat.* 46, *num sortiuntur (atomi) inter se quae declinent, quae non?* with a glance at the *sortitio prouinciarum*. The statement that the *turbulenta concursio*, which followed the *clinamen*, could not produce the *κόσμος* was a commonplace. There is not the

slightest ground for saying 'qui Cicerone o improvvisa *Marte suo* o ha molto frettolosamente riassunto suo fonte.' We have here the common but absurd assumption that anything in Cicero's writings in which the modern critic can pick holes must of necessity involve misconception of his sources.

In 219 the word *depellere* receives support from the use of *depellere* and *pellere* (transitive in reference to the atoms) by Cicero in *Fat.* 22. But it is useless to appeal, in defence of the intransitive sense, as some scholars do, to *deflectere* and other verbs which are regularly transitive, but occasionally intransitive. The Latins might conceivably have used any active verb in a neuter sense; the point is that they did so use some and not others, while we have no reason to think that *depellere* was so used. The insertion of *se* before *incerto* in 218 is by far the best remedy.

II, 249, 250. *sed nil omnino regione uiui | declinare quis est qui possit cernere sese?* Before *regione*, *recta* was early supplied; Lachmann inserted *nulla*. Perhaps *quoquam* is the right word; compare I, 428; II, 716; IV, 504.

II, 251, 2. *denique si semper motus conectitur omnis | et uetere exoritur nouus ordine certo.* Before *nouus* the word *semper* is added in some inferior MSS.; Lachmann read *uetere exacto*. Possibly the Lucretian *porro* has fallen out before *nouus*.

II, 254. *quod fati foedera rumpat.* So Verg. *Aen.* VI, 882, *si qua fata aspera rumpas*; Liv. I, 42, 2, *nec rupit fati necessitatem*. But the *foedera naturai* cannot be broken (I, 586, and II, 302). *Fatum* here is the Stoic *εἰσπράξις* against which the Epicureans railed; the unbroken chain of causation at which also the words *ne causam causa sequatur* hint. See my note on Cic. *Acad.* I, 29. There is an interesting attack both on the Stoic *εἰσπράξις* and on the Democritean *ἀνάγκη* in the inscription of Oinoanda.

II, 257. *unde est haec inquam fati auolsa uoluptas | per quam progredimur quo ducit quemque uoluntas?*

Lambinus transposed *uoluntas* and *uoluptas*, and is followed by Giussani. But the substitution of *potestas* for *uoluptas* by Lachmann is far better. It is not the *uoluntas* which is *auolsa fati*, but the *potestas*, and this word constantly appears when reference is made to the freedom of the will (by Cicero, Seneca, and others). In MSS. *uoluntas* and *uoluptas* are very frequently confused.

II, 262. *motus per membra rigantur.*

An imitation in Arnob. *Adu. g.* II, 2, *deus: a quo omnia . . . animantur motu irriganturque uitali.*

II, 272. *nec similest ut cum.* Compare *similiter ut si* in Cic. *Off.* I, 87; *Tusc.* IV, 41, and *eadem ut si* in *Off.* I, 42, and *eodem modo ut* in Ad. Herenn. I, 10. Also *aeque ut* is given by MSS. in Plaut. *Asin.* 838; Hor. *Od.* I, 16, 7, and Plin. *Ep.* I, 20, 1. In expressions of the kind *ut* takes the place of *ac* before gutturals in the best writers; see my note on Cic. *Acad.* II, 34.

II, 279. *in pectore nostro* edd.; but Q has *in iectore no* and O gives *iniector*. The archetype was here frayed on its edge. *Nobis* would be rather more Lucretian than *nostro*. *Iectore* came from *pectore* by way of *tectore*; cf. note on 43.

II, 333, 4. *qualia sint et quam longe distantia formis | percipe multigenis quam sint uariata figuris.*

The line 334 recurs at III, 32, and (on the ground of tautology) has been supposed to have been foisted in here from III or (Giussani) to have been jotted down by Lucretius on the margin of his autograph. So far as tautology goes, the passage is no worse than IV, 456, *seruat enim formaturam seruatque figuram*, or IV, 176, or IV, 774-6, or VI, 653. Nor is the asyndeton harsher than in many places, as III, 943. But perhaps *quam* before *sint* is, as often, an error for *quom*.

II, 342. *praetere* MSS.; *praeterea* Nonius. Curiously, in a quotation from Atta, the MSS. of Nonius (202) give *praetere* for *praeterea*. Brieger champions the text by supposing a marvellous anacoluthon, in which nominatives absolute (*genus*, etc.) are resumed by *quorum* in 347. He quotes IV, 123 sq. in support, but a glance will show the uselessness of the reference. Brieger ignores the senselessness here of *praeterea*. Munro's ingenious but somewhat unnatural correction, *praeter eat*, hardly deserves Brieger's comment '*paene inepte*.' After 341, l. 342 should begin with some word indicating an inference; perhaps *propterea*, which is often confused with *praeterea*, as in II, 760, 793. A line has probably been lost containing the verb to which *genus*, etc., were subjects.

II, 347, 8. *quorum unum quiduis generatim sumere perge | inuenies tamen inter se differre figuris.*

These lines as they stand are not satisfactory; *unum quiduis* could not imply the selection of several members of the same genus, and

without that neither *tamen* nor *inter se* can be appropriate. Probably again a line has been lost of which the following will give the sense : *atque iterum quiduis eadem de forma animantum*. Again a line seems to have disappeared between 350 and 351 ; in the latter verse *nota* seems to indicate a lost general reference to animals. The doctrine that every member of a genus or species differs perceptibly from every other was Stoic as well as Epicurean. The Sceptics waged war on this ground ; see my note on Cic. *Acad.* II, 85.

II, 362. *fluminaque illa* : here *illa* = 'there, where she is.' A not uncommon sense, but often misunderstood. An extreme example is in Cic. *Fam.* III, 6, 1, *ille aduentus*, 'arrival by that route.' Munro says *illa* is 'emphatic in a good sense, as I, 82, *illa Religio* in a bad,' but this interpretation is insipid.

II, 363. *subitamque auertere curam*. Neither 'sudden pang' (see Bailey in *Class. Rev.* XVI, 330) nor *cura quae subiit*, as an interpretation of *subitam* (Munro), is tolerable here. Many have been the corrections, of which the oddest and worst is *subidam*, taken to mean 'burning' (Baehrens in *Archiv.* III, 278). Perhaps *saeuam*, the corruption having begun with the common passage of *v* into *b*.

II, 371. *postremo quoduis frumentum non tamen omne | quidque suo genere inter se simile esse uidebis*.

It must be admitted (as Bruno thought) that the Latin is strange ; *frumentum* is the *genus*, but *omne* implies every individual within it. If *frumentum* could be taken as equivalent to *granum* (which is impossible) the difficulty would be lessened. The meaning seems to be 'any class of cereal is not all through its members uniform, whatever the class (of cereal) be.' The change of *quidque* to *quique* (Lachmann) is of course necessary.

II, 381. *perfacile est animi ratione exsoluere*.

There seems to be no reason why *animus* should be introduced here, and some connecting link with the preceding paragraph is needed ; this is given either by *tali* (Lachmann) or *parili* (Bernays). The former enables the corruption to be more easily explained. *Animus* is a word which was early and often contracted by copyists, and *ali* would be easily mistaken for *āi* = *animi*. Giussani's contention that the *ratio* is different, so that *tali* is unsuitable, is surely hypercritical. Some corrections have been meant to supply an object to *exsoluere* ; but the parallel with *resolui* in V, 772, is sufficient.

II, 394 sq. Can the tract of Epicurus 'περὶ τῆς ἐν ἀτόμῳ γωνίας' have had any reference to the subject-matter of this passage, as Giussani supposes? It is more natural to refer it to the theory of the *minimae partes* within the atom. That atoms are *uncinata*, *hamata*, etc., was already held by Democritus; see Cic. *N. D.* I, 66, and *Acad.* II, 121. The passage of the *De Placitis* in which ἀγκιστροειδεῖς ἄτομοι are stated to be un-Epicurean, is of course erroneous (Usener, § 270).

II, 408. *omnia postremo bona sensibus et mala tactu*. Giussani is right as against Munro in understanding *bona et mala tactu sensibus*. Lucretius could hardly have written *bona sensibus* in the sense 'good to the senses,' nor *mala tactu* for *m. tactui*.

II, 421. The ending of this line (*uidentur*) has been assimilated to that of the preceding. But the whole context proclaims the improbability of *figura* (Schneidewin, Lachmann, Munro) as has been seen by several scholars. I suggest *manet res* with *creata* in 422.

II, 423. The adjective *principialis* occurs in Latin only here and in V, 246, *principiale aliquod tempus*, where it has another and a more natural meaning. Lucretius may have written *principiorum* here as in 672.

II, 453, 4. Goebel's transposition of these lines gets rid of every difficulty excepting that involved in *haustus*: *namque papaueris haustus item facilis quasi aquarum*. The only possible sense 'it is as easy to drink down poppy seed as water' is absurd. Giussani refers to a boy's trick (still practised in Italy, he says) of cautiously moving a handful of poppy seed to the mouth, so that the air may not blow it away, and then swallowing it at a gulp. I have seen this explanation praised by a competent scholar; it appears to me to leave the absurdity undiminished. I would read *actus* for *haustus*; the corruption may have begun with the common intrusive *h*. For *facilis actus* compare *cunctantior actus* in III, 192. In the context there the poppy seed is mentioned; and the ease with which a heap of it is dispersed is compared with the movement of water and honey. That passage is so like this that *actus* acquires a considerable probability. Giussani supports *perculsus* as a noun, but does not explain how 'a striking' could become *uolubilis*. It cannot be a participle, whether *haustus* or *actus* be read. The old correction *procursus* (applied by Verg. *Aen.* XII, 379, to a rolling wheel) is probable; cf. *prouolui* in 470.

II, 455. After this Giussani (with Hörschelmann) places 465 sq. because there the subject is that of fluids, whereas in 456-464 smoke, cloud, and fire are mentioned. But these so closely resemble fluids that the change is needless.

II, 460, 1. *pungere uti possint corpus penetrareque saxa.*

Many have been the corrections. In itself *penetrareque saxa* would be unobjectionable, but when connected with *corpus*, which here can mean nothing but the human frame, it is grotesque. A correction which I made for *saxa* many years ago, was suggested also by Everett in *Harvard Studies*, VII, 29, viz., *ad ossa* in place of *saxa*; which may have come in here from 447. For *ad ossa* compare VI, 1168, and I, 355, *rigidum permanat frigus ad ossa.*

II, 461 sq. *quodcumque uidemus | sensibus sedatum facile ut cognoscere possis non e perplexis sed acutis esse elementis.*

Few passages of Lucretius have been so much the subject of emendation as this. The verb *sedare* occurs in 952, where the context bears much resemblance to the present; there an attack on the bodily frame is made, yet the *uitales motus* are able *ingentis plagae sedare tumultus*. But the expressions there are easier, because *ictum oblatum* and *oblato ictu* precede. Munro has illustrated *sedatum*; I may add Ad Herenn. II, 48, *alias res posse aut uetustate sedari* . . . The phrase in Lucian, *Dial. Mor.* XI, 1, *κατάσβεσόν μου τὰ τραύματα* corresponds closely with Ovid, *ex Ponto*, IV, 11, 19, quoted by Munro. The verb *sanare* is used in a similar connection by Sen. *Dial.* II, 10, 4, *quosdam ictus recipit (uirtus) sed receptos euincit et sanat et comprimit*. It seems that the balance of probability is in favor of the text; Lucretius meant 'whenever we see something which the senses have to make an effort to overcome, we may know that it is composed not of atoms entangled together, but of pointed atoms, lightly connected.' [Of course *quodcumque* must be interpreted with strict reference to the context.] Giussani's text has a number of dislocations about here for which sound reasons are not produced. I cannot follow Housman (*Journ. of Phil.* XXV, 233) when he says that the senses could not be said *sedare* anything. If the senses are disordered by an attack from without and recover, they may very well be said to bring the attack to a pause. For *quodcumque* is not (as Housman thinks) the object which makes the assault, but the assault itself. The suggestion of Housman *sentī*

ibus esse datum ('all the prickliness allotted to them') is most ingenious, but how would *senti* ('allotted to them for a thorn') suggest the quality 'prickliness'?

II, 483. *namque in eadem una cuiusuis in breuitate.*

Munro *eodem*, with comma; Giussani (with Brieger) *iam breuitate*, giving *iam* a strange position. The *in* before *eadem* is possibly intrusive, and *eadem atque una* may be the true reading.

II, 498, 9. *ne quaedam cogas immani maximitate | esse, supra quod iam docui non posse probari.*

Brieger and Giussani think there is a reference to a lost passage preceding 478. But surely Lucretius may have assumed that the absurdity of the infinitely large atom has been demonstrated by the whole course of his argument from the beginning. The word *rursum* in 481 is no proof of a lacuna. It means there not 'again,' but is continuative, as very often: 'a further consideration is that.'

II, 515, 6. *denique ab ignibus ad gelidas hiemisque pruinas | finitumst.* Munro accepted *iter usque* for *hiemisque* from Lachmann (cf. V, 653), but suggested *hiemum usque*, which Bailey has placed in the Oxford text. But the genitive plural *hiemum* is found in no extant passage of literature, though Priscian and a scholiast attest it. It has been without cause substituted for *hiemem* in Cic. *Rab. Post.* 42. Some noun is needed as subject to *finitumst*. I would rather read *spatium usque*.

II, 517. *omnis enim calor*: 'heat to its fullest extent,' like *uapor omnis* in V, 383.

II, 521. *rigidis infesta pruinis*: 'molested . . . by stiffening frosts,' Munro. But *infestus* is regularly used of the thing that molests, not the thing molested. The word here means 'to be dreaded'; in V, 760, *loca flammis infesta* are places detrimental to the sun's fires; and in Mela, III, 44, which Munro quotes, *tellus infesta frigoribus* is a land to be dreaded (by men) for its cold. Compare II, 1143; III, 899.

II, 533. Here MSS. have *magis* for *minus*, a curiously common error of scribes; see e.g. Ad Herenn. III, 34. So *minime* and *maxime* are confused in Cic. *Diu. in Caec.* 10. Editors from Lambinus to Lachmann substituted *minus* for *magis* in IV, 1227.

II, 537, 8. *anguimanus elephantos, India quorum | milibus e multis uallo munitur eburno.*

Munro remarks 'I know no other mention of this fable,' but does not explain his idea of the fable. I long ago compared Plin. *N. H.* VIII, 31, *in extremis Africae [dentes elephantorum] postium uicem in domiciliis praebere, saepesque in iis et pecorum stabulis pro palis elephantorum dentibus fieri Polybius tradidit auctore Gulusa regulo*. That there was a tradition of India being defended by a barrier of elephants is shown by a speech in Quint. Curt. IX, 2, 15, *modo quis beluas offerentes moenium speciem, quis Hydasphem amnem* (the *fabulosus Hydaspes* of Horace!), *quis cetera auditu maiora quam uero sustineri posse credebat? Olim hercule fugissemus ex Asia si nos fabulae debellare potuissent*. The word *moenium* there reminds of *uallo* in Lucretius. And, of elephants in an actual battle, Quint. Curt. VIII, 12, 7, *elephanti quoque per modica interualla militum agmini immixti procul castellorum fecerant speciem*. The story went that as soon as the Indus was passed elephants would have to be encountered; compare Lucian, *Quo modo scribenda sit historia*, XXXI, οὔτοι ἐπεραιώθησαν τὸν Ἰνδὸν ποταμόν· ὅτι δὲ καὶ πράξουσιν ἢ πῶς δέξονται τὴν τῶν ἐλεφάντων ἐπέλασιν . . . Defoe seems to have met with a tale that elephants in great numbers naturally range themselves for defence in a regular line like a wall. 'We saw several lines of battle thus; we saw one so long that indeed there was no end of it to be seen, and, I believe, there might be two thousand elephants in a row or line' (Captain Singleton, in *Camelot Series*, p. 104). Many stories have from of old been told of apes arranging themselves in battalions, for battle, after human fashion.

It seems then that Lucretius meant by *uallo* a living wall of elephants, not a fabulous battlement of ivory. Compare Veget. *mil.* I, 20, *apud antiquos murus dicebatur pedestris exercitus*; Hygin. *mun. castr.*, p. 20, ed. Gemoll, speaks of soldiers holding a position *corporali muro*. There are many metaphorical applications of *uallum*, *uallatus*, *murus*; cf. Cic. *Cato m.* 51, *uallo aristarum*; *N. D.* II, 143, *u. pilorum* (of the eyebrows); Varro, *Sat. Men.* § 370 (Buecheler), *oculos quos . . . palpebrae uallatos mobili saepto tenent*; Plin. *N. H.* IV, 181, *cor munitum costarum et pectoris muro*; Corippus, *Joh.* I, 574, *uallatumque suis*; *ib.* V, 620; Ovid. *Am.* I, 14, 15, *uallum pectinis*; Ad Herenn. IV, 159, *radiis uallatus acutis*; Livy, XXXII, 17, 14, *hastarum uelut uallo*.

II, 543. *cui similis toto terrarum sit orbi.*

So O Q, but Q has a correction *non sit in orbe*. Lachmann and Munro write *nulla sit orbi*. Perhaps Lucretius' words were *non siet orbi*. So *siet* in II, 962 and 1079; III, 101.

II, 547. *quippe etenim sumant oculi finita per omnem*, etc. For *sumant oculi* there have been many emendations; Munro's *sumam hoc quoque uti* is called 'a futile conjecture' by Housman in *Journ. of Phil.* XIV, 367. The reading *sumantur uti*, favored by several scholars, gives a curious attraction, which I have illustrated in a note on Cic. *Lael.* 56. The words *sumam hoc* seem fairly certain; after that I would read *aeuom finita per omnem*, as in 561.

II, 593. *impetus Aetnae*: 'the heaving mass of Aetna.' For the concrete sense cf. V, 200, *caeli impetus ingens* (so Cic. *N. D.* II, 97); V, 913, *tanto membrorum impete*. In IV, 414, *tanto impete* merely expresses *distance* in space.

II, 599. *genitrix*, applied to earth, as *mater* often is on tombstones. Cf. Buecheler's *Carm. Epigr.* 809, *mater genuit materque recepit*; Lucr. II, 998.

II, 600, 601. *hanc ueteres Graium docti cecinere poetae | sedibus in curru biugos agitare leones.*

As I suggested many years ago, and others have suggested since, the only change needed is to read *currus*; *sedibus in currus* represents ἐν δέφποις. The comma after *leones* should be removed, and one placed after *spatio*.

II, 603 sq. As Servius on *Aen.* III, 113, says, the goddess *ipsa est terra*. So when she rides in a chariot she shows that earth does not rest on earth. The passage in Servius corresponds in most respects with Lucretius; he has (1) a passage like 600-603; then (2) *ideo sustinetur rotis quia mundus rotatur et uolubilis est*; (3) a passage corresponding to 604, 5; (4) one like 606-609; (5) one like 640-643; but (2) is obviously un-Lucretian, and is like Varro's explanation (quoted by commentators) of the goddess being seated; viz. to indicate the fixity of the earth, while all else revolves around it.

II, 607. *eximiis . . . locis.*

Perhaps Lucretius had in view *pulcrisque locis se dant* in the familiar passage of Ennius about Romulus, where the Aeschylean *παμπρέπτοις ἐν ἔδραισι* is imitated.

II, 624, 5. *ergo cum primum magnas inuecta per urbes | munificat*, etc.

The words *cum primum* suit very ill the annually recurring festivals to which Lucretius alludes. A better meaning would be given by *ex quo* for *cum*, 'ever since she began to . . .'

II, 629 sq. *hic armata manus Curetas nomine Grai | quos memorant Phrygios inter se forte quod armis | ludunt in numerumque exultant sanguine fleti* (O Q) . . . *Dictaeos referunt Curetas*.

The word *hic* must mean 'in this ceremony.' Can the poet have intended to say that the performers, 'whom the Greeks call Phrygian Curetes,' represent the Dictaeon Curetes? Probably the word *Curetes* in 629 has come in from 633 and ousted *Corybantas*, who were specially Phrygian, though sometimes assigned, like the *Curetes*, to Crete. For *sanguine fleti* I suggest *s. foedi*; compare IV, 844, *lacerare artus foedareque sanguine membra*. The word *forte*, as in I, 85, is somewhat strange; it cannot, of course, be the equivalent of *fortasse*.

II, 631. *in numerum*. So *in modum*, 'after the right fashion,' in Cic. *Fam.* XVI, 18, 1 (much misunderstood); just as *locus* often means 'the right spot.'

II, 667. *tanta . . . dissimilis ratio . . . tanta est*.

It is true that Lucretius is fond of attaching two unlinked epithets to a noun. But the combination of *tanta* with *dissimilis* seems unnatural, and I know no parallel elsewhere. Very possibly *tantum* should be read in both places, as in Hor. *Sat.* II, 3, 313, *tantum dissimilis*, and 317, *tantum magna*. And *tantum . . . quantum* with adjectives in Hor. *Sat.* II, 3, 80; Vell. II, 11.

II, 670. *quae sunt porro distantia longe*.

Giussani's substitution of *formis* for *porro*, merely because *porro* appears twice elsewhere in the paragraph, is quite unwarranted. The word occurs five times in I, 507-529. Giussani's idea that the triple *porro* must mark off three separate and distinct topics is not borne out by the usage of the poet.

II, 671. *si nil praeterea tamen haec in corpore traduntur*.

So O Q; the word *cremantur* at the end of the preceding line has partly caused the error. The words *condunt*, *cobent*, *celant*, *aluntur* have been conjectured; I should prefer *praebent*, because of the frequent confusion of *p*, *t* in the MSS.

II, 692. *currat*. For *intercurrat* (cf. 373), according to the custom of Lucretius, substituting a simple for a compound verb.

II, 707. *certa genetrice*. Here *genetrice* = *materia*, which Lucretius connected with *mater*.

II, 716, 7. *intus | uitalis motus consentire atque imitari*. The accusative *motus* with *consentire* is unparalleled, for it is unlike other accusatives with *consentire*, such as that in Livy's expression *consensit et senatus bellum*. It is hardly likely that Lucretius meant *consentire* to be taken literally 'to feel in common,' though in III, 740, the literal meaning is given to *consensus*. Perhaps the presence of *imitari* is responsible for *motus*; but 916, *uitali sensu consentire*, raises the question whether *uitali motu* may not be the correct reading here. For *intus* (which Munro and Lachmann read) O Q have *inte*, with *inter* as a correction in Q. Old editions gave *intra*; Brieger *inde*; Bernays *in se*. The true lection may be *autem*, since *neque autem* is a favorite Lucretian turn.

II, 734. *alium quemuis imbuta colore*. So O Q. The change to *colorem* made in an inferior ms. or a larger change (*alio quouis*) is of course necessary. But *induta* is a better reading than *imbuta*. The transition from *d* to *b* is easy. In the next line *gerere hunc (colorem)* chimes in better with *induta* than with *imbuta*. And the idea contained in *induta* is repeated in 797 *nullo uelata colore*, where *uelata* has been wrongly suspected; see note there. In the only other passage of Lucretius where *imbuta* occurs it has the ablative construction.

II, 748. *quod quoniam uinco fieri nunc esse docebo*.

It has generally been assumed that a line has been lost here. But if due stress be laid on the present *uinco*, and on *esse* as the equivalent of *uerum esse*, there is no need to suppose the loss: 'and as I am endeavoring to make you believe that this is what happens, I will now proceed to prove its truth.' For the change made by most editors in the next line, *in* for *et*, compare Cic. *ad Q. Fratrem*, III, 9, 2, where the first hand of the Medicean has *et*, the second *in*. Brieger's statement that *omnis color mutatur in omnis* is *uix Latinum* is strange.

II, 791. *nec quae nigra cluent de nigris sed uariis ex* (O Q *ea*).

The curious sudden change from *de* to *ex* arrests attention; and still more the presence of a monosyllabic preposition at the end of a line which concludes a sentence. In such circumstances Lucretius places at the end no monosyllabic words on which it is not natural that

emphasis should fall; verbs, as *sunt, sint, fit, fles, des*, etc.; substantives, such as *uis* and *res* (both common), *fors, sus, sol*, etc.; or pronouns (commonly *se*, also *nos, his*). When a monosyllabic adverb or conjunction ends the line, there is no stop; and this consideration is sufficient to condemn a conjecture of Brieger in II, 1162 (*suppeditat iam*). The only other examples of a preposition at the end of a line are in III, 667, and VI, 279 (*cum* in both cases, and of course without stop). The facts raise a strong presumption that a line has been lost between 791 and 792, such as *seminibus quae saepe inter se conciliantur*. Thus the change from *de* to *ex* (the only possible correction for *ea*) becomes much more natural, in passing to a fresh clause, in which circumstances such changes are common, for mere variety's sake, as e. g., Cic. *Fam.* X, 28, 3, *illa cognosces ex aliis, a me pauca*; Varro, *R. R.* I, 16, 4 (*de, ab*); *ib.* I, 22, 2 (*ad, ob*); Cic. *Acad.* II, 112 (*e, a*). Similarly there is often a passage from a verb compounded with one preposition to the same verb compounded with another, as in Cic. *Acad.* II, 18, 144.

II, 797. *scire licet quam sint nullo uelata colore.*

'You may be sure they are clothed with no color,' Munro. He has no note; but he can hardly have understood the *quam*-clause as equivalent to an accusative with infinitive. Strictly, *quam* should imply degree; and we have here a slight illogicality; *quam* does not qualify *sint*, because, *ex hypothesi*, there is here no question of degree. The sense is 'how true it is that . . .' etc.; the qualification is of a word or idea understood, but not expressed. The word *uelata* has been questioned, as applied to color; but cf. Ovid, *Tristia*, I, 1, 5, *nec te [liber] purpureo uelent uaccinia fuco*; and there are many such metaphors with *uestire* (Vergil), *tegere*, and similar verbs. Even Cicero talks of 'clothing' the walls of a villa with pictures (*uestire*). It is quite possible that *tecta colore* of the mss. in II, 501, is correct, though changed by nearly all editors.

Giussani rightly exposes the want of logic shown by Lucretius in assuming that things which we cannot see are necessarily without color.

II, 802. *pluma columbarum quo pacto in sole uidetur | quae sita ceruices circum collumque coronat.*

Giussani (after Brieger) has *ceruicemst*, because he thinks *sita* must = *sita est*, and because in two other places Lucretius has *ceruix*. The first reason is doubtful; *sita* may be a participle going with *ceruicem*

circum collumque, and the two nouns may have to be understood as objects of *coronat*. The second reason is groundless. Many writers use both *ceruix* and *ceruices*, as they do *collum* and *colla*.

II, 804. *interdum quodam sensu fit uti uideatur | inter curalium uiridis miscere zmaragdos.*

Many attacks have been made on *quodam sensu*. Brieger obelizes the words. The necessary meaning could only be conveyed, he says, by *quodam luminis ictu* (as just below), and Bockemüller saw the fault, but did not cure it by his conjecture *escensu*. Yet, what does it matter whether the result is said to be brought about by 'a certain impression of sense' or 'by a certain impact of light' which produces an impression of sense? The lines II, 1013, 1014, show how easily the physical fact and the sense-perception of it run together; and other examples could easily be produced. In IV, 447, the words *quodam sensu* occur again. Bignone, in *Riv. di filol.* XXXV, 100, argues that that passage does not support ours, because in it a *false* sense impression is meant, while in ours the impression is *real*. Hence, noticing *obuersa* in 807, he proposes here to read *uorsu*, defending it as an archaism. The reasoning is unsound. The context in both places is the same; in both Lucretius is dealing with those changing colors on which Sceptics constantly relied in order to prove the untrustworthiness of the senses. See Cic. *Acad.* II, 19, with my note. In Epicureanism there is, of course, no false sense impression; there are only false inferences drawn by the mind.

II, 830, 1. *color . . . filatim cum distractumst disperditur omnis.*

For *filatim* cf. *κατὰ μίτον* in Cic. *Att.* XIV, 16, 3. Whether *disperditur* can be propped up by Horace's *perditur* (*Sat.* II, 6, 59) is very doubtful. Commentators on Horace appeal to Lucretius, and commentators on Lucretius to Horace. To me the absence of *perdi* (apart from *perditus*) from good Latin, except in these two passages, seems a sufficient condemnation of both. There is a strong presumption that Lucretius wrote either *dispergitur* (Lachmann, Munro) as in I, 309, and III, 539, *dispergere* being a favorite word of his; or *discerpitur*, as two lines above. The repetition of the same word within a small space is common with Lucretius. Perhaps Horace wrote *carpitur interea misero lux*, just as Catullus has *illic (Romae) mea carpitur aetas* (LXVIII, 35). The word might, by the common trick of transposing letters, have been written *parcitur* and then changed to *perditur*.

II, 845. *et sonitu sterila et suco ieiuna feruntur.*

This is, I think, an isolated example of *ieiunus* with an ablative. It has the genitive construction in Cic. *De Or.* II, 9 (cf. *ieiunitas* in *Orat.* 106) and later. Nor is *sterilus* with ablative a probable construction for the time of Lucretius. Pliny, in *Paneg.* 56, makes *sterilis* (joined, however, with *uacuu*s) take an ablative. Lucretius probably wrote here *sonitus* and *suci*. When *sonitus* lost its final *s* before *sterila*, *suci* was naturally changed to correspond.

II, 869. *manu ducunt.* Compare my note on Cic. *Acad.* II, 139.

II, 886-8. *tum porro quid id est animum quod percutit ipsum | quod monet et uarios sensus expromere cogit | ex insensilibus ne credas sensile gigni?*

The comma must necessarily be placed before *ipsum*, though editors have often put it after the word. After *animum quod percutit ipsum* the phrase *quod monet* (*animum*) would be a queer anti-climax. Lucretius has contrasted 'the man himself' with his mind, exactly in the fashion of Homer. The word *sensus* has been condemned by Postgate, in *Journ. of Phil.* XXIV, 134 sq., in reliance on Quint. VIII, 5, 1, a passage which proves to be most nebulous when examined in detail. Quintilian states (1) that the *ueteres* (whoever they were) employed *sententia* to denote *quod animo sensissent*; (2) that this ancient usage has left some traces in every-day phrases, as *ex animi sententia* in formal oath-taking; (3) that the *ueteres* sometimes spoke of *sensa sua*, because *sensus* seemed to them to belong to the body; (4) *sed consuetudo iam tenuit ut mente concepta sensus uocaremus, lumina autem praecipueque in clausulis posita sententias*. The worthy professor of rhetoric made many vague pronouncements, but none vaguer than this. All that can be deduced from it is that he regarded the reference of the word *sensus* to the mind, as well as the technical use of *sententia* to which he refers, to be of comparatively recent origin. There is nothing whatever to indicate that he deemed the employment of *sensus*, which Postgate questions, to have been introduced after the time of Lucretius. Postgate says there is no example of this in Republican Latin, but he allows the occurrence of *sensus* = 'perception' as Republican. It is easy to show that in the best period of Latin the word covers the whole range of meaning which lies between 'feeling' and 'thought.' Compare for instance (I give a mere selection of passages) Ad Herenn. IV,

27, *quodam animi sensu*; and *ib.* III, 19, 24; Cic. *N. D.* I, 80, *sensu mentis* (in a general sense, as opposed to madness); *Parad.* 6, *ex meo sensu deducta oratio*; *Lael.* 27, *adplicatione animi . . . cum quodam sensu amandi*; *De Orat.* II, 148, *uoltus sensum animi plerumque indicat*; *Orat.* 185, *oratio ad animorum sensus exprimendos reperta*; *Nep. Alc.* 5, 2, *sensu* ('views on politics'); *id. Dion.* VIII, 2; *Caes. fragm.* 142, 22, *tanta eius humanitas, is sensus, ea in me beneuolentia*. This last passage (like scores of others) will show how unnecessary was the change of *sensu* into *sententia* made by Manutius, Baiter, Wesenberg, and others in Cic. *Fam.* I, 9, 17: *sensu saepe iam tabellaeque docuerunt*. As applied to animals, *sensus* is often 'instinct,' as opposed to sensation; so in *Lucr.* V, 1087, where the words *uarios sensus* occur again. The widespread phrase *communis sensus* certainly does not mean either 'common sensation' or 'common perception,' at least in the sense which Postgate appears to attach to that word. And the uses of *sentire* run parallel with those of *sensus*. Postgate conjectured *fetus*, comparing Catullus, LXV, 3, *nec potis est dulcis Musarum expromere fetus | mens animi*, but the similarity with Lucretius is not close. The combination *sensus uarios* occurs in Val. Flacc. VII, 189, *ergo iterum sensus uarios super hospite uoluens | maeret*.

I may add that when I read Postgate's note, I was rather surprised that he had not quoted in support of *fetus* the remarkable reading of O Q in 891, *fedus* for *rebus*, which might conceivably have come from a lection *fetus* in 887. But the common substitution of *d* for *b* and the necessary consequence, the change of *redus* to a word which was Latin, account for *fedus*. A copyist was, of course, often quite happy when he had secured a Latin word, whether it made sense in the context or not.

II, 889, 890. *nimirum lapides et ligna et terra quod una | mixta tamen nequeunt uitalem reddere sensum*.

Giussani (in a note of attenuated subtlety) demands the change of *lapides* to *latices*. But it is perfectly natural for those who oppose the derivation of life from lifeless matter to say 'take stone, wood, and earth and mix them together in any way you like; nothing living will ever come of it.' To substitute water for stone is no improvement. Below, Lucretius shows how living things do spring from *ligna* and *glabrae*; if he had written *latices* above, there is no reason why he should not have treated it in the same way; *lapides* he could not.

II, 903 sq. *deinde ex sensilibus qui sensile posse creari | constituunt
porro ex aliis sentire sueti | mollia cum faciunt . . .*

There has been general agreement about one point in this notorious passage, viz., to assume a hiatus after 904. It must be admitted that Munro's interpretation of *porro ex aliis sentire sueti* 'accustomed thus to derive their own sense from elements [which are sensible] in their turn,' is as harsh and forced as anything could well be. It has usually been supposed that one line only is lost, and that (reading *suetis*) it enforced the conclusion that *sensilia* are perishable. And this is the only conclusion which is at all necessary to the context. But Giussani assumes a larger gap, in which he thinks that Lucretius attacked what Anaxagoras was bound to support, the infinite indivisibility of *sensilia* (so below 981 sq.). For many years past, every fresh reading which I have given to the passage has increased my suspicion of the words *ex aliis sentire sueti*. They seem to have sprung from a marginal gloss on the words *ex sensilibus* in the line above, which has driven out the original ending of the line. The change to *sueti* was perhaps made by a copyist who thought the meaning must be 'accustomed to take their opinions at second hand.' [This impossible idea has actually been put forward in modern times.] Something like *mortalia cuncta fatentur* may have concluded the line, and of course it is not, in that case, necessary to assume that anything has been lost.

II, 904 sq. . . . *nam sensus iungitur omnis | uisceribus neruis uenis
quaecumque uidemus | mollia mortali consistere corpore creta.*

Munro and others read *quae cuique*. But Lucretius has a passion for *quicumque*, and its use here is no stranger than in IV, 64, *omnes quaecumque cibum capiunt animantes*; strictly *quaecumque* would imply that there are some creatures which do not take food. [Giussani's quotation from Cic. *Leg.* III, 3, *equitem cumque qui regat*, gives, of course, an impossible reading.]

II, 908, 9. *nempe tamen debent aut sensum partis habere, | aut simili
totis animalibus esse putari.*

Giussani gravely proposes to read *sensus partes*. To say nothing of prosody, the meaning of the reading 'portions of the sense which a complete sentient being possesses,' is not within the bounds of Latin possibilities. And *partes* in 910 is strongly against any change.

II, 910, 911. *at nequeant per se partes sentire necesse est | namque alios sensus membrorum respuit omnis | nec manus a nobis potis est secreta neque ulla | corporis omnino sensum pars sola tenere.*

The conjecture of Bernays, *nam ratio* (keeping *respuit*) is condemned by Giussani for a reason which has nothing to do with this passage, viz., that in the Epicurean system the senses are infallible guides to truth. Here *ratio . . . respuit* would be very like *ratio reclamat uera* in I, 693. But the change, it must be confessed, is somewhat violent. Munro and others write *namque alio . . . respicit*, with Lachmann. I hardly think that Lucretius could have written the line thus. It is indeed explained by what follows; but, taken by itself, it would convey doctrine which he emphatically repudiates in III, 359 sq. To me the whole line as it stands in the MSS. has a suspicious appearance, as though it had originated in the brain of a scribe rather than in that of the poet. The line which comes before 924 in the MSS. (*uitali ut possint consentire undique sensu*) is better placed before 915 (as by Lachmann and Giussani, with comma at *adsimulentur*) than after it (as by Bernays and Munro).

II, 926. *quod fugimus ante.*

So O Q, but, as Munro says (against Lachmann), the reading is indefensible. The true correction can be nothing but Wakefield's *quo fugimus ante*. Cicero would have said *quo confugimus* (see *Thesaurus* s. u. *confugio*); and Lucretius so speaks himself in III, 766, but he very frequently substitutes a simple verb for the more ordinary compound. [Giussani has *quod diximus ante*, a weak reading.]

II, 931 sq. *quod si forte aliquis dicet dumtaxat oriri | posse ea non sensu sensus mutabilitate | aut aliquo tamquam partu quod proditum extra.*

So O Q; *a* (or *e*) *non sensu sensum* edd. generally. But *sensus* may be right (so Lachmann). The most natural correction of *quod proditum extra* is that of Pontanus, accepted by Bernays and Giussani, viz., *quod proditur extra*. Munro rejects this, because he thinks a subjunctive verb is necessary, and writes *quod proditus extet*. But even if *quod* be right, his argument is not conclusive, for the verb in a *quod*-clause in *oratio obliqua* is undoubtedly sometimes left in the indicative, even by the best writers, and if Lucretius wrote *quo*, as I think probable, the indicative is still easier. With *quo*, we have strict parallelism of con-

struction between *mutabilitate* and *partu*, and the causal idea conveyed by *quod* seems scarcely in place. The subject-matter of the whole paragraph 931-943 is most obscure, and hardly any light has been thrown on it by commentators. The theory which Lucretius here repudiates has not a little resemblance to that widespread story which he himself accepts in V, 801-820, where birds in the earth's early age come out of fortuitously produced eggs, and animals out of fortuitously produced *uteri* which adhere to the ground. Here the words *aliquo tamquam partu* and the reference to the eggs in 927 forcibly remind us of the passage in V. It appears then that Lucretius did not object to the idea of an *aliquis tamquam partus*, but only to the mode in which his opponents presented it, apparently picturing it as sudden and magical, not as the culmination of a long slow process by which suitable material was gathered and consolidated. Possibly the disputants who favored *mutabilitas* were not the same as those who imagined *aliquis tamquam partus*. The word *mutabilitate* seems to indicate that Lucretius had in mind the Aristotelian and Stoic doctrine of Form and Formless Matter (πανδεχῆς ὕλη or δι' ὅλων τρεπτῆ as the Stoics termed it) *quae omnia accipere possit omnibusque modis mutari* (Cic. *Acad.* I, 27). Spite of the constant reproaches of the other schools, the Epicureans, as a rule, left this doctrine severely alone, deeming it too arbitrary and irrational for notice. Their proof that nothing exists but atoms and void, effectually barred it out. What Lucretius says is too brief to be lucid. He may have had an unfulfilled intention of expanding his utterance; or he may have thought the subject not worth more than a passing allusion.

II, 975. *quid genus humanum proprium de quibus auctumst?*

Nonius quotes *actus* for *auctumst* (p. 511). Munro (reading *factumst* with Lambinus) has a critical note here which has always seemed to me (*pace tanti uiri*) passing strange. 'Lamb. ed. 3 adds most truly *Primum Latine dici non potest auctus de re aut ex re aliqua. Nam auctus casum septimum sine praepositione postulat. Deinde aliud est auctus re aliqua, aliud factus de re aut ex re aliqua hoc qui nescit, fateatur se hospitem esse in lingua Latina.*' Lambinus flatly denies that a preposition could follow *auctus*. He was clearly oblivious of V, 322, *quodcumque alius ex se res auget alitque*, and of many similar passages. He cannot have supposed that *auget ex* was

possible, *auctum est ex* impossible. Munro comes to his aid: 'speaking of course of the atoms of which a thing is made: V, 322, and the like have nothing to do with the question.' A hard saying. Did he mean that when the atoms are indicated as a source the expression, *augere ex*, though Latin under other circumstances, becomes un-Latin? Or did he draw a line between *augere* and *auctus*? If *ex* had stood in the mss. here instead of *de*, is it even likely that Munro would have sanctioned the dictum of Lambinus? Munro then proceeds to fall upon Wakefield who 'more fearless than the angels keeps of course *auctum*' and quotes Wakefield's denunciation of editors for making wanton changes in the readings of mss. Munro ends thus: 'Truly *delira haec furiosaque cernimus esse Et ridere potest non ex ridentibus factus*.' Surely, Wakefield herein receives hard measure.

Although I have not noted any example of *augere de*, followed by a word indicating the source of increase, of earlier date than the third century, there are many close analogies which show that the absence of examples is a mere accident. Cicero, for instance, uses many times *creocere ex*, once or twice *creocere de* (*Verr.* II, 5, 173). Of course, *auctum*, meaning 'built up,' is Lucretian enough. There is still less reason in 986, *non ex ridentibus auctus*, to substitute *factus* for *auctus*.

The strange word *proprium* was found by Nonius in his text of Lucretius; on the other hand, Arnobius must have obtained from the same line the more regular form *propriatim* (*Adu. g.* III, 43), which the poet may well have written. In II, 173, one or two inferior mss. have *blanditum* which Lambinus conjectured.

II, 1004 sq. *nec sic interemit mors res ut materiai | corpora conficiat, sed coetum dissipat ollis, | inde aliis aliud coniungit et efficit omnes | res ita conuertant formas mutantque colores . . .*

Lachmann thus comments on 1004: '*neque ut coniunctio abesse potest, neque mors ea quae peremit restituere dici potest nisi per technas ab hoc poeta alienas*.' He then conjectures *coniungitur et fit ut omnes*. Munro evidently disagrees with one part of this criticism, but allows the other, for he leaves *coniungit*, but substitutes *effit ut* for *efficit*. Moreover, he casts a slur on Wakefield for thinking the omission of *ut* to be possible. But the dictum about *ut* is questionable; compare Ovid *Fasti*, III, 683, *effice . . . coeamus*. It is indeed hard to trace the limits of the direct dependence of subjunctives on verbs, especially in

poetry. With regard to *effit*, there is no certain warrant for the existence of this form, except in Plaut. *Pers.* 761. Munro refers to Lucr. VI, 761, but the MSS. there have *quibus e fiant causis*, which may well be right. [H. Nettleship, in *Journ. of Phil.* XXI, 233, introduces *effiant* into Cic. *Tusc.* V, 43, on the strength of a careless quotation by Nonius, who replaced *efficiantur* by *fiant*.] In 1005 *ita* = *ita ut fit*, as in III, 154.

I do not know what the *technae ab hoc poeta alienae* are, to which Lachmann alludes. Perhaps the reference is to such passages as those where the winds are said to *calm* the sea. But it must be remembered that to our poet, death is a mere synonym for change.

II, 1029. *quod non paulatim minuunt mirarier omnes.*

'*Mihi hoc Latine dici posse non uidetur, minuo hanc rem facere,*' Lachmann. An unfair substitution. The general usage of the substantial infinitive protects the text; it is no harsher than the *uereri perdidit* of Plautus or the *vinci contemnerent* of Cicero.

II, 1030. *principio caeli clarum purumque colorem . . .*

There is no regimen for *colorem*; and the anacoluthon, which has appeared monstrous to most recent commentators, is still thought possible by one or two. Brieger, of course, was ready to champion almost any abnormality of the kind. Munro and Giussani read, with Bernays, *suspicio* (from 1039); Lachmann's *percipito* is nearer the MSS. I would rather, however, read *perspicio*; compare Cic. *Lael.* 88, *si quis pulcritudinem siderum perspexisset*; *Leg.* I, 61, (*animus*) *cum caelum terras maria . . . perspexerit*.

II, 1033. *omnia quae nunc si primum mortalibus essent | ex improviso si sint obiecta repente . . .*

Munro wrote *nunc* for *sint*, thinking it to have dropt out because of *nunc* above, and to have been replaced by *sint*. Although there is much laxity in the relation of tenses in poetry and the older Latin, the irregularity here is extreme. We have two protases, not protasis and apodosis; and the different tenses belong to the same verb. Moreover, *essent* is in itself feeble and open to suspicion. By far the simplest and most probable correction is Orelli's *extant*, which does a double service. Munro thought the imperfect tense necessary; but the poet might well visualize the creation as actually occurring.

II, 1038, 9. *quam tibi iam nemo fessus satiate uidendi | suspicere in caeli dignatur lucida templa.*

There have been two views of *quam*. If it is a pronoun referring to *species* in the preceding line, it might depend on *uidendi*. That is awkward enough; still more so is it to suppose it governed by *susplicere*, the words *in caeli lucida templa* being epexegetic (Ellis). Again it has been taken as exclamatory, and indeed expressions like *quam . . . nemo . . . dignatur* are found elsewhere. But the exclamation seems weak here. Perhaps *quam* is erroneous for the Lucretian *quin* 'on the contrary,' as in I, 588, and II, 799. The nearness of *species* would easily bring about the change.

II, 1058 sq. *cum praesertim hic (orbis) sit natura factus et ipsa | sponte sua forte offensando semina rerum | . . . tandem colerunt* (O Q, with correction *coierunt* in Q) *ea quae coniecta repente | magnarum rerum fierent exordia.*

Brieger, followed by Giussani, writes *et ipse*. Although this is well suited to the context, it is very doubtful whether Lucretius could have written *et ipse* as the equivalent of *καὶ αὐτός*. The late MSS. give *colarunt* for *colerunt*; this Munro adopts, placing *ut* before *ipsa*, and rendering it (awkwardly) 'according as.' It would be better understood as 'when' (see on I, 1030). Giussani follows Lachmann in writing *coluerunt* (= *coaluerunt*) and placing *ut* after *offensando*, and interprets *ut* as 'when.' Lachmann made other changes near by. No further alteration of the MSS. readings is needed if (after Lambinus) *coluerint* is written. The clause *ea quae . . . fierent* is limitative of *semina*.

II, 1072. *uis eadem natura manet.*

This is preceded by *si*, and the talk is of the *semina rerum*. The old correction, accepted by Munro, is *uisque eadem et natura*. Here *uis* seems right; cf. *uis principiorum* in V, 184. Postgate would read *hisque*, saying that a dative is needed; but with *semina* immediately following, and the same word in 1070, there is no possible obscurity.

II, 1080. *indice mente inuenies.*

So O Q. Could Lucretius have written thus, meaning 'with your own thoughts to guide you'? If so, the words would give in a condensed form the sense of I, 402, 3, *uerum animo satis haec uestigia parua sagaci | sunt per quas possis cognoscere cetera tute*, and the lines that follow. It is hard to prove the reading impossible, but scholars are doubtless right in rejecting it 'on instinct.' Munro accepts *inclute*

Memmi from Gronovius, who took it from V, 8, the only place where *Memmi* has an epithet attached to it. The corruption of *inclute* to *indice* would be fairly easy, *cl* passing, as often, into *d* and *t* into *c*; the change of *Memmi* to *mente* would be a forced alteration to make sense. But the emendation of Lipsius, *inice mentem* (cf. I, 50, *animum adhibe*) is easier. The phrase has been questioned, and *adice mentem*, a commoner expression, preferred. Cicero writes in *N. D.* I, 54: *inquam se iniciens animus atque intendens*. He might well write *inicere animum*, just as he and others write *intendere animum*. In *Mil.* 84, it is said that the spirit of violence inspired Clodius: *mentem iniecit . . . ut*. This is merely an example of another common use, *inicere aliquid alicui*. The only objection to *inice mentem* here lies in the abruptness of the parenthesis. Ovid, *Met.* XIV, 319, *tu dictis adice mentem*, has a Lucretian ring, but it is not an imitation.

II, 1087 sq. *quando quidem uitae depactus terminus alte | tam manet haec et tam natiuo corpore constant | quam genus omne quod his generatim rebus abundans.*

Lucretius is arguing for the plurality of the *mundi*. There is nothing unique in existence; all things exist in classes and we must believe the same of earth, sun, moon, and sea. But the three lines just quoted give no logical proof of the position, as they should; they merely assert that earth, etc., are subject to birth and death like all other things. Some lines must have perished before 1087. Munro reads in 1089 *hic* for *his* and *generatimst*: 'as much as any class of things as here abounds in samples of its kind.' *Res* is a word of all work in Lucretius, but it is put here to a very strange use. Animals alone have been mentioned in this and the preceding section. One would have expected something like *prolis abundans*; or perhaps *stirpis abundans*. If *generatimst stirpis abundans* was written by Lucretius, the first two letters of *stirpis* would easily disappear, and *rebus* would be an almost inevitable change.

II, 1146-9. *omnia debet enim cibus integrare nouando | et fulcire cibus, cibus omnia sustentare, | nequiquam, quoniam nec uenae perpetiuntur | quod satis est neque quantum opus est natura ministrat.*

Scholars have disputed about the true position of these lines in the text. Quite apart from this question, there seems to me to be something wrong with the lines in themselves. Lucretius uses the phrase *nequiquam quoniam* many times, and in every other passage it has a

close and direct bearing on what immediately precedes. Here the thought is obviously incomplete: 'food must sustain everything [but in the cases contemplated the attempt is made] in vain, since, etc.' Apparently at least one line has been lost between 1147 and 1148.

II, 1161, 2. *conterimusque boues et uiris agricolarum, | conficimus ferrum uix aruis suppeditati: | usque adeo parcut fetus augentque labore.*

Postgate (*Journ. Phil.* XXIV, 136) interchanges *conterimus* and *conficimus* on the strength of a supposed difference in usage which I am unable to verify. Both verbs are often connected with the toil of men and animals, and *conficere* is no different here from what it is elsewhere in Lucretius (I, 238, 535, 906; II, 1002). [The *Thesaurus* gives *conficimus* a strange meaning, 'we make,' as in *conficere nauem*, etc.] Brieger, putting a comma at *conficimus*, reads *suppeditat iam*, which is not only metrically unsound (see note on l. 791), but yields a grotesque sense: 'scarce iron enough is found for ploughing the fields.' Giussani follows. The only possible interpretation for the MSS. reading *uix suppeditati* is 'scarce supplied in sufficient numbers to work the fields.' The rendering often adopted, 'scarce supplied with land enough' would fit in well with l. 1172, but usage forbids us to take it so; see note above on I, 229. Against the conjecture of Ellis, *suppetiati*, is the fact that this verb is not of certain occurrence in any author of earlier date than Apuleius. Moreover, *uix* is then unsuitable. The whole line *conficimus ferrum uix aruis suppeditati* has to me a spurious look. The combination of *conficimus ferrum* with *uix aruis supp.* is not natural or happy; and the whole context, apart from this line, treats of the scantiness of crops, not of men.

The imitation of the end of the second book of Lucretius by Cyprian, *Ad Demaratum*, was pointed out by Boissier, *La fin du Paganisme*, II, 304, and independently afterwards by one or two writers.

AN ATTEMPT TO RESTORE THE γ ARCHETYPE OF TERENCE MANUSCRIPTS¹⁾

BY ROBERT HENNING WEBB

THE restoration of the recension of Calliopius continues to be the main problem in the text-criticism of Terence, and scholars are still at variance as to whether this recension is preserved in its purest form by the δ or by the γ family of manuscripts. The first step, evidently, in the solution of this important problem, is to determine a method of selecting from the readings offered by the several mss. of each group the one which represents the reading of the archetype of the group. Such a method I shall attempt to outline for the γ family, leaving to others the task of defining more clearly than has yet been done the relations existing between the members of the δ branch of the tradition.

For the restoration of [X], the archetype of the γ family, four²⁾ primary sources have hitherto been available. Besides the Parisinus (P) and Vaticanus (C) of Umpfenbach, other scholars have called attention to the Dunelmensis (O) and Lugdunensis (λ). The former was proved by Charles Hoëing,³⁾ whose results have been widely accepted, to be a remarkably accurate and valuable member of the γ group, copied, it is true, not from [X] directly, but preserving the distinguishing characteristics of this archetype. The Lugdunensis, containing a fragment of the *Haut.*, was brought to light by Kauer,⁴⁾ and placed in close connection with P and C.

¹ This article is based upon a dissertation written in 1909, entitled *Quomodo restituendus sit Liber unde orti sunt Codices Terentiani C, P, O*. I wish to acknowledge at the outset the many suggestions and constant advice received in the preparation of this paper from Professor E. K. Rand.

² I leave out of account the Basilicanus (B), which is generally agreed to be a copy of C, and in that case to have no independent value for our purpose.

³ *American Journal of Archaeology*, 2d Series, 4 (1900), pp. 310-338.

⁴ *Wiener Studien*, 28 (1906), pp. 111-137.

I believe that new light is thrown upon this whole question by Parisinus 7900 (Y), an illustrated ms. which has been unduly neglected.¹⁾ I was able during the past summer to make a somewhat rapid, but I hope reasonably careful collation of this ms. through the *Andria*, *Haut.*, and *Phormio*. In addition to this new material, I can also use for the study of the γ family more complete information concerning the readings of P, C, and O. I made some examination of P, but found most valuable of all the corrections of Umpfenbach's report noted by Professor Minton Warren on the margin of his copy of Umpfenbach's text, which it was my privilege to have the use of a short time after Professor Warren's death.²⁾ He also here and there noted readings of C, which manuscript has been available at first hand only in the facsimile of the *Phormio* owned by the Harvard Library.³⁾ A list of readings in C was examined for me by Miss Dora Johnson, Research Associate in Latin Literature of the Carnegie Institution, attached to the American School of Classical Studies in Rome. Hoeing's collation of O for the *Andria* I can supplement by that of the *Haut.* and *Phormio*. Throughout this paper I shall, to avoid confusion, indicate corrections of Umpfenbach's critical apparatus by italicizing the letter which represents the ms., without specifying the particular source of the information. A general description of Y will not be out of place as an introduction to our study.

PARISINUS 7900

Parisinus 7900, formerly Puteanus, afterwards Regius 5573, is a parchment ms. of 48 folia, 29 × 23 cm., of which the writing occupies a space of 22 × 16.5 cm. It contains the six plays of Terence, in the

¹ E. Bethe discusses Y on p. 65 of his introduction to the DeVries-Sijthoff facsimile edition of the Ambrosianus (Leyden, 1903). It is also referred to by J. C. Watson, *Scene-Headings and Miniatures in the MSS. of Terence*, *Harvard Studies*, 14 (1903), pp. 60 and 168. Otherwise there has been little mention of Y. Madame Dacier in the preface of her edition seems to refer to Y in connection with P, commending the miniatures of both, and saying that they are the oldest of the Terence mss. in the Bibliothèque Royale. Cf. also for brief notice of Y, Geppert, *Serapeum*, 12 (1851), p. 371, and *Jahrb.*, Supplementband 18 (1852), pp. 557, 564, etc., and Otto Engelhardt, *Die Illustrationen der Terenzhandschriften*, Jena, 1905, p. 9.

² Cf. Warren, *A F P*, 3 (1882), p. 60, and Hoeing, *op. cit.*, pp. 311 and 335.

³ For the *Haut.* 522-904, Kauer, *op. cit.*, has given accurate information concerning P, C, and other mss.

order *Andria*, *Eunuchus*, *Haut.*, *Adelphi*, *Hecyra*, *Phormio*, written without verse-distinction in small minuscules of the early tenth century.¹ The division between words is never very marked, and for the most part scarcely perceptible. Frequently we find a final *e* joined by $\&$ with a following *t*. Capitals are not used consistently, except at the beginning of a new scene. In the *Andria* the scribe begins to write as a capital the initial after each *nota personarum*, but soon becomes very irregular in this habit.

Abbreviations are very few, and even the more common forms are used but sparingly, such as those for *-tur*, *-rum*, *esse*, *que*, *per*, *pro*, *nostra*, the superscribed stroke for final *m*, etc. The *cauda* is rarely employed with *e*. I noted but two instances of the abbreviation for *-mus* — *Phorm.* 87 (*dabamus*) and *Phorm.* 102 (*eamus*); of those for *sunt* and *quod* only one instance each (*Phorm.* 1020 and 504); *quid* is not abbreviated. Ligatures also are infrequent. The scribe never combines *c* and *t*, though *nt* and *ns* are often found in ligature at the end of a word.

The only form of punctuation employed by the first hand is the period, and the sign 7 at the top of the line ending a scene. Other marks have been inserted here and there by later hands, especially on folia 6 (*Andria*) and 44 ff. (*Phormio*).

Before the MS. proper is a folium of parchment added later, containing on each side two columns of writing in a hand different from that of the text, but not dissimilar to that of the scholiast.² Fol. 1 r as far as the middle of the second column is taken up with the Orosian *Vita: Terentius comicus* — *Hecyra Formio*. Then this addition:³

Set nunc de Andria videamus. Andria prima fabula huius ideo vocatur eo quod ex Andro insula Graecorum venit Crissis femina (Athe)nas ubi haec acta referuntur et cum Crisside alia quae vocabatur Glicerium sive Passibula licet ista Glicerium non esset ex Andro set potius Atheni-

¹ This is the date assigned by several scholars to whom I showed photographs of two folia of Y. The catalogue date is also S. X.

² Cf. *inf.*, p. 62.

³ Found also in the Halensis (cf. p. 5 of the Bruns edition of Terence, 1811), and in practically the same form in two Bodleian MSS. Auct. G. 135 (= B. N. Rawl. 135, S. XIV/XV) and Laud 75, S. XV. This is the only portion of the *vita* preserved in Parisinus 14755, S. XII.

ensis sicut consequentia manifestant. Argumentum autem totius fabulae istud est.

Here begins the prose argument of the *Andria*, starting with *Bello exorto*, and ending on 1v near the end of the first column with the words: *qui eam ducere volebat*. Then, in a mutilated condition, and in part illegible, follows the addition to the *Andria* argument found also in the Halensis:¹⁾ *Sensus vero totius fabulae iste est——valete et plaudite*. The right hand column of 1v is blank except for two lines of scribbling which seem to read:

*Floriacus datur esse iacus vel flos benedictus
a folio vel flore pio cognomine dictus.*

Does this couplet connect our MS. with Fleury?

The manuscript proper begins on what is now numbered fol. 2r with *And. 78 — dinem accepit condicionem*. Each page contains forty lines, with about twenty words to a line. The scribe makes every effort to save space and becomes more and more sparing of it as he proceeds with his task. He allows about eight²⁾ lines for each picture, but never across the whole width of the page unless the picture contains four or more figures. For pictures of one, two, or three figures, the space allowed varies from one to two thirds of the width of the page.³⁾ If the picture is at the top or bottom of the page, six lines only are left vacant, and the artist utilizes part of the margin.⁴⁾

If my calculations are correct, two folia have been lost from the manuscript. The first of these was at the beginning, and contained on the recto the *Armarium* with masks of the actors⁵⁾ (or space for it), Index of the plays, and Portrait of Terence, and on the verso the *Periocha* of Sulpicius Apollinaris, text and picture of the Prologue, and the first fifty-one lines of Scene 1, including the miniature at the begin-

¹ See Bruns, p. 7. Found also in the two Bodleian MSS. just referred to.

² Occasionally larger spaces are left: at *Haut.* 1, 1, ten lines, and at *Haut.* 5, 5, eleven lines below the scene-heading, which occupies two lines.

³ At *Ad.* 5, 7, and *Phorm.* 3, 2, only a little more than half the page width is left for four figures, and at *Ad.* 5, 9, and *Phorm.* 4, 3, a space of two thirds the width.

⁴ At *Ad.* 4, 5, and 4, 6, only four lines are left below the scene-heading at the bottom of the page, and at *Hec.* 5, 1, only three lines.

⁵ For the spaces usually left for the *Armaria* in Y, see p. 61. This conjecture is, of course, made upon the basis of what we see on the first folia of C P O.

ning.¹⁾ The other folium was lost at the beginning of the *Eunuchus*. At present, the last words of the *Andria* contained in Y are *virgo tumille* (l. 924), at the bottom of fol. 7v. 8r begins with the picture at *Eun.* 1, 2.²⁾ All this could be contained in one folium³⁾ as follows: *And.* 924 to end, 33. 5 lines, Picture at *And.* 5, 3 (three figures), 5 to 8 lines, *Eun.* Didascalia, 15 to 22 lines,⁴⁾ *Eun.* 1, 1-81, 13 lines, Picture at 1, 1 (two figures), 4 lines: Total 70 to 80 lines. This takes no account of the *Armarius*, Prol. Figure, Periocha, and Prol. 1-30, which are not found in P and C. Our reckoning cannot be accurate enough to determine whether Y contained the remainder of the *Eun.* Prol. (ll. 31-45), which C omits, a passage which would occupy only four or five lines of Y.

From the first quaternion, then, the first and last folia have been lost, the leaves which are at present numbered 2 to 7 making up the remainder. The second quaternion embraces folia 8-15, the third 16-23, the fourth 24-31, the fifth 32-39, the sixth 40-47, and a single folium is left over at the end.⁵⁾

¹ Counting twenty words to the line, the *Periocha* would occupy four lines, the Prologue Figure, eight lines one third of the way across the page (= 2.5 lines), the Prologue, eight lines, 1, 1, 1-51, nineteen lines, and the miniature at 1, 1, eight lines (four figures): total forty-two lines, approximately the length of the page.

² At the bottom of 7v a modern hand has written in black ink: *Desunt reliqua Andriae et principium Eunuchi*, and at the top of 8r, *Ex Eunucho*. So at the top of 2r the same hand wrote: *Deest Prologus Andriae et aliquid ex prima scena*, and on the left margin v. 78.

³ Bethe's calculations here are based on inaccurate data (*l. c.*, p. 65).

⁴ The Didascalia of the *Hec.* in Y take up twenty-two lines, *Haut.* nineteen; but *Ad.* eleven lines, and *Phorm.* six lines.

⁵ The quaternions are marked as follows:

II at the bottom of 7v,				
III " " " "	15 v and	II in lighter ink,		
IIII " " " "	23 v "	III " " "		
V " " " "	31 v "	IIII " " "		
VI " " " "	39 v "	V " " "		
VII " " " "	47 v "	VI " " "		

No doubt the numbers in lighter ink are the original signatures. At the lower right hand corner of 47v is a short line corresponding to one at the lower left hand corner of 48r, probably as a guide to the binder.

The manuscript is written by one hand, except ll. 797-871 of the *Andria*, which were omitted by Y¹. On fol. 7r, line 22, are the last words of *And.* 4, 4, after which, without leaving space for a picture, the first hand continues on line 23 the opening words of 4, 5, *CR. In hac habitasse platea dictumst Crysidem quae sese*. Here there is a sudden break, and the rest of 7r is left blank by the first hand, which begins again with ll. 872 ff. after the picture at 5, 3, on the top of fol. 7v.¹ C¹ and P¹ omit here ll. 804-853, and from the additional loss in Y, Bethe² argues that Y was copied from [X] after the latter had lost not only the folia containing 804-853, but two others containing respectively *And.* 796³-803 with the picture at 796, and 854-871 with picture at 872. That any two folia of Y's archetype could have contained respectively 8 lines and a picture and 18 lines (for Y retains the picture at 872) is a manifest impossibility. It seems highly probable that the parent ms. of Y had lost no more than had the original of C and P, but that the scribe of Y, after starting to transcribe the beginning of 4, 5, found in his archetype the lacuna of 804-853 indicated in some way, possibly by certain signs, and so, instead of copying the remaining fragments 797-803 and 854-871, left the whole passage out, and began on 7v with a new scene (5, 3). In so doing he left at the bottom of 7r a space of 17 lines, which would be sufficient to contain in the scribe's small hand ll. 797-803 and 854-871, together with the picture at 796. Why the scribe did not leave space for this picture at the beginning of the scene, before he wrote *CR. In hac . . . sese*, it is difficult to see. It may have been due to carelessness, just as no space is left at *Phorm.* 1, 2, or to his hesitation in deciding how to treat an evidently confused passage. It is noticeable that he left space for the insertion of the picture further down on the page.

¹ The loss was repaired by later hands using a source clearly different from that of Y¹. The first of these correctors wrote in very pale ink ll. 797 (*inhoneste optavit*) -838 (*cum Davo*), ending with the last ruled line of the page. Here a smaller hand begins, and writes as far as *ecquid te pudet* (871), utilizing the lower margin of 7r and the space to the right of the picture at the top of 7v.

² *L. c.*, p. 65.

³ So Bethe; l. 796 seems to me to be by the first hand. If I am wrong about this, however, my explanation need not be materially changed.

The miniatures do not extend beyond *Eun.* 4, 3 (fol. 11v), but after this the spaces for them are left vacant. The pictures are very similar to those in C and P, but are more crudely drawn, without color, in apparently the same brown ink as that used by the hand which wrote the text. The following minor differences may be detected between the pictures in Y and those in P. At *And.* 3, 1 the figure of Lesbia carries a staff. At *And.* 3, 5 the space is large enough for two figures, but that of Davus alone is represented, in the same attitude, however, as in P's miniature. At *And.* 4, 4 the door has the usual twisted curtain, which is wanting in P. At *Eun.* 3, 2 the artist fails to reproduce the distinguishing headdress of Thais. At *Eun.* 3, 4 and 4, 2 there is no picture, but the usual space is left. At *Eun.* 4, 3 the figure of Davus, on the extreme right, is omitted although there is room for it. At *Phorm.* 1, 2, there is no space for a picture.

The MS. contains no *Armaria* with masks of the actors, found before the several plays in C and P. However, a space of 25 lines is left just before the Argument of the *Haut.* (fol. 16r), and a similar space before the Argument of the *Ad.* (fol. 24v). In the case of the *Hecyra*, 19 lines are left vacant (top of 33v), and 11 lines before the Argument of the *Phormio* (fol. 40r).

There are no scene-headings before *Haut.* 4, 4.¹ From here on they are always found, even after the pictures cease. Red capitals are used, and are apparently by the same hand as the *notae* in the text. The latter consist of three, or, if necessary, four letters of the name, and are also in red, which has been generally retraced in black as far as *And.* 513 (fol. 5r). At this point a darker ink is used for the text,² and the *notae* also have this same dark shade until we reach *PAM ohe* (l. 616) at the top of fol. 6r. The space for the next *nota*, before *visus sum*, is not filled, and red *notae* again begin with *PAM heodum*. The similarity between the black *notae* here and the red *notae* of the rest of the MS. would make it appear that the first hand is responsible for all *notae*, both red and black, and probably for the scene-headings also.

The regular Didascaliae are found at the beginning of each play (except of course the *And.* and *Eun.*), done in alternate lines of red and

¹ *Simo Davus* at *And.* 1, 2 is evidently a later addition.

² There is no indication that the hand changes here.

green capitals. The ink is very much faded, and in parts, especially where green was used, illegible. At the end of the *Phormio* (fol. 48r) can be deciphered

TERENTI EXP

OEDIA PHORMIO

and after a vacancy of two lines BONO SCOLASTICO. It is quite possible that in the space between the two lines preserved was once written FELICITER CALLIOPIO, in which case the subscription will agree with what we find in C and P.¹ Y has *Calliopius recensui* only at the end of the *Hecyra*. It was added by a later hand above ADELPHOE EXPL on fol. 33r.

The value of our manuscript as indicating the history of the text tradition is increased by the fact that it has been comparatively little tampered with by later hands. At least two correctors, however, have made changes here and there and added variants. Scholia occur in considerable number only on the first folium of the ms. proper. They stop abruptly at l. 214, although the fol. does not end until l. 235. They are written by a later hand in pale ink, often illegible, both between the lines and on the margin, in which case they are connected by signs with the words in the text to which they refer. About half these glosses are the same as those in the commentary of the Halensis. The following are all the scholia on the first thirty-five lines (*And.* 78–112), so far as my very hasty transcription may be trusted. They are interlinear, unless otherwise stated.

79 condicionem :² legem vivendi. cepit vivere meretricialiter. occipit : occupat. sumit ex ob et capio. 80 ut fit : ut fieri solet. 82 continuo : s. cepi dicere. captus : amore crididis. 83 habet : quod habet. observabam : considerandum (?). illorum : s. amatorum. 84 venientis : de domo illa (?). abeuntis : s. ad domum. heus puer : adverbium vocantis. 85 sodes : socie (?) *et in marg.* sodes .i. si audes ut quidam d set nihil ī (?) est. autem amicum verbum blandientis. 86 teneo : s. nomen. Phaedrum : pro plura nomina amatorum. 87 Nicaretum : s. tenuisse illam. 88 amabant : illam. heoquid : adverbium interrogantis. symbolam : unus de pueris respondit quod non dicebant illam

¹ Dziatzko is therefore wrong when he reports (*Comm. Wölff.* 223, n. 1) that Y lacks this subscription.

² The lemmata are from Umpfenbach, not from Y.

amare; *et in marg.*: conferentiam, collationem dedit ciborum. 90 quaerebam: interrogabam. nihil: pro non. 91 enimvero: pro certa causa vel coniunctio. spectatum: cautum, mirabile. 92 putabam: illum filium meum esse. exemplum: esse. 93 conflictatur: contendit. eiusmodi: (*in marg.*) quibus filius meus primum floruit. qui ignem in sinu portat non comburitur. 95 scias: pro scis. modum: temperamento .i. [or]dinem, dispositionem. 96 placebat: quod audiebam. 97 laudare: laudabant fortunas: felicitates. 98 praeditum: repletum, ornatum. 99 hac fama: bona opinionē filii mei; *et in marg.* fama bona. 100 ultro: sponte, non invitatus a me. gnatam: philumenam quam solam credebant. altera cum avunculo relicta. 101 filio: s. meo. 102 placuit: mihi. dictus: dicatus, consecratus. 103 quid: igitur.¹⁾ 104 fere: prope. haec: quae superius dixi. 106 filius: meus. 107 una: simul. frequens: studiosus. 108 funus: Crisidis. dum funus procuret. 109 placuit tum id mihi: (*in marg.*) quod funeri illius inter 110 sic cogitabam: s. male de illo cogitabam vel suspicabam. hic: filius meus. 111 fert: .i. flet. familiariter: amicabiliter. 112 quid si ipse: quantum faceret. amasset: illam. patri: (*in marg.*) .i. multo magis [pro me] flebit.

Y is much more carefully copied than either P or C. It is surpassed in this respect only by O and λ. Taking as a criterion *Haut.* 522–904, and using Kauer's corrections of Umpfenbach, we find these statistics:²⁾ P makes 38 mistakes not found in any other manuscript, C 48; or, if we include only those errors which are clearly not corrected by the first hand, we find for P 29 and for C 20. λ makes only 14, of which 9 may have been corrected by the first hand. In O there are only three independent mistakes: 677 *olim* omitted, 699 *aut* for *at*, and 850 *auferetur*, corrected by apparently a later hand into *auferretur*. Y makes 17 errors, of which the first hand may have corrected 9.

Haut. 612 qui: quid — d *eras*. 643 lubet: iubet. 648 multa — 1 *add. interlin.* 660 si ita: sita, i *add. interlin.* 672 triumpho si licet: triumphos i||licet. 684 O *om.* 691 sicine: scine, i *add. interlin.* 695 collocetur: collicetur. 723 me *ex sne ut apparet a ras.* 738 lubet:

¹ D G H Br M and Schol. C read *quid igitur obstat?*

² Here and elsewhere I have not taken into consideration errors in orthography or in the division of words.

iubet. 814 tua: ti || ||, tua *interlin. a man. post.* 829 inque: inquit Y¹.
 847 dari vult: vult dari . 866 quoque: quo Y¹. 883 quos: quo,
s add. interlin. 888 quod: quod *ex* quid. 897 equidem: quidem.

THE MIXED MANUSCRIPTS

Before taking up the interrelationships of the γ MSS. as such, I wish to discuss, as briefly as may be, the place in the stemma occupied by the family of *Codices Mixti*, which is by far the largest of the three groups, embracing as it does the whole mass of later MSS. This family is represented in Umpfenbach's apparatus by the Riccardianus (E) and Ambrosianus (F), and scholars have held various opinions as to their respective connection with γ and δ . Ritschl¹ groups with γ , F and all the inferior MSS. (*reliquorum codicum multitudo vulgarium*). He was followed by Leo.² Schlee,³ on the other hand, connects E and F with δ . Umpfenbach was the first to apply the term "mixed" to the Riccardianus.⁴ This classification is accepted by Dziatzko,⁵ who, however, in another place⁶ ascribes E to δ . F Dziatzko groups with γ . In his edition of the *Phormio*, Hauler includes E F under the title "mixed," and uses the sign μ to designate the class. He is followed by Kauer⁷ and Fairclough.⁸ Bethe is not very definite. He offers a stemma in which he represents F as occupying a position between δ and γ . With F he groups E (p. 7), but later (p. 9) he implies that E F are to be connected with the δ branch. There seems to be a general tendency in favor of connecting E F more closely with γ than with δ ,⁹ — a tendency due partly, no doubt, to the very evident γ affiliation of F in the matter of both text and pictures. But, so far as I know, no statistics on the subject have been published.

An attempt to classify E F should be preceded by an examination of other manuscripts which are closely related to them. Such is the very unjustly neglected Halensis (H) S. XI, exactly reproduced in printed

¹ *Opuscula*, 3, 293.

² *Rhein. Mus.* 38 (1883), 317.

³ *Scholia Terentiana*, p. 37.

⁴ *Philol.* 32 (1873), 468.

⁵ Cf. Leo, *Götting. Gelehrte Anzeigen*, 1903, p. 992.

⁵ *Comm. Wölff.* (1890), p. 221.

⁶ *Rhein. Mus.* 46 (1891), 52.

⁷ *W. S.* 28 (1906), III-137.

⁸ *Andria* (1901), pp. 154 ff.

form by P. J. Bruns in his edition of Terence, 1811.¹ H is correctly grouped with E by Umpfenbach,² who, however, deems it worthy of but scant notice in the preface to his edition.

In very close relationship to the Halensis stands Bruxellensis 9705 (Br) S. X, of which I found mention in the notes of Professor Warren. This manuscript was collated for Sauppe, and the variants entered in the margin of an Umpfenbach text now in the library of Bryn Mawr College. Through the courtesy of the latter I have been able to examine the readings of Br, and find them so nearly identical with those of H as to indicate that the two mss. had the same original.

Interesting in this connection is the Monacensis (M), which Schlee derived from the δ family, even going so far as to maintain its superiority over any member of that group. This opinion has strangely passed unchallenged.³ For even from the incomplete list of readings published by Schlee, and chosen more or less with reference to their bearing on his own theory, it is quite clear that M is to be connected with the mixed group, although with that branch of it which has received the strongest δ influence.⁴ Besides having the γ order of plays,⁵ M almost everywhere follows E F H Br, whether the latter show allegiance to δ or to γ . In only twelve places in the *Haut.*, and in only three in the *Phormio*, does the Monacensis agree with δ against the other members of the mixed group. Moreover, the few readings which are peculiar to μ , M, where quoted by Schlee, never fails to show, e. g.:

Haut. 677 *habeo optumam: optumam habeo* E F H Br K Z M
(*obtimam* F).

Phorm. 1022 *quid: so* H Br M (E F lacking), *qui* P Y D, *quid* C,
corr. C² (O G lacking).

¹ Cf. E. K. Rand, *Class. Philol.* IV, 4 (1909), p. 365.

² *Philol.* 32, 468.

³ Cf. Ashmore, *Class. Rev.* 8 (1894), p. 353 ff.; Dziatzko, *Fahrh.* 149 (1894), 465 ff.; Lejay, *Revue Critique*, 1893, 2, pp. 270-273. But Hauler, *Phormio*, p. 188, n. 7, gives a hint of M's true position.

⁴ Cf. *infra*, p. 74.

⁵ This order is shared by the mixed group as a whole, but some fifteenth century mss. have the *Hec.* after the *Phorm.* Geppert, *Serapeum*, 12 (1851), pp. 373-5, makes this report of the Paris mss. 7907, 7909, 7918. I find the same true of Brit. Mus. Ar. 247, Bod. Auct. X. 1.5.8, and E. D. Clarke, 28.

Phorm. 271 *minus rei foret aut famae temperans: minus aut famae foret rei temperans* E F H Br M (*aut famae foret aut rei* E).

973 *venias: veneas* H Br M $P^2 C^2 Y^2 D^2$ (E F lacking).

122 *fiat: fiet* E H Br M F.

Haut. 95 *ita* om. E¹ M.

To the mixed group are to be referred four illustrated mss. of which specimens were published with the Ambrosianus facsimile and discussed by Bethe: Leidensis Lipsianus 26, S. X, which I venture to call Ld as a substitute for Bethe's L, because the latter designation has long represented the Lipsiensis (Stadtbibl. Rep. I, 4, 37), Vaticanus 3305 (S), S. XI/XII, Parisinus 7903 (Z), S. XI, and Leidensis Vossianus 38 (N), S. IX.

Ld Bethe concludes¹ to be of the same family as E F, but more closely connected with δ than with γ . Our information in regard to this ms. is too slender to warrant a conjecture regarding its exact position,² but we may cite three passages which show its allegiance to γ : *And.* 398 *interea aliquid*: so Ld γ E H Br, *aliquid interea* D Δ (*aliquid* om. G); *Eun.* 1031 *me hodie vivit*: so Ld γ H Br, *me vivit hodie* D E N (*me* is written above the line in G); *Haut.* 423 Ld $\gamma \mu$ omit *quidem*. Compare also *Ad.* 38 *in animo instituere: instituere in animo* Ld E F.

S Bethe does not classify, but from the few lines which are reproduced in facsimile, its connection with μ is clear: *And.* 527 *ipsus: ipse* $\gamma \mu$ S; *And.* 529 *has fieri: fieri has* γ E Br S (*has* om. H); *And.* 530 *dubium est mihi: dubium est id mihi* $\gamma \mu$ S (*dubium est mihi id* E); *And.* 532 *Chremem* (gloss) om. S $\gamma \mu$; *And.* 579 *verba audies: audies verba* $\gamma \mu$ S; *And.* 580 *ipsum* om. $\gamma \mu$ S; *And.* 714 *me opperire: opperire* (or *operire*) *me* $\gamma \mu$ S; *And.* 720 *laborem*: so $\gamma \mu$ S, *dolorem* D G. On the other hand, *And.* 531 *nolit*: so S $\mu \delta$; *And.* 532 *in* retained by S δ ; *And.* 577 *suadet: persuadet* S G E H Br, D scholiast; *And.* 712 *ut* is retained by E S δ ; *And.* 713 *ego* (gloss) add S E D G.

¹ *Op. cit.*, p. 24.

² As to Bethe's conjecture (p. 46) that Ld has some connection with C, because there is a space for a picture at *Haut.* 5, 2, where there is no picture except in C, cf. *inf.*, p. 86.

N is believed by Bethe to be a pure δ ms., and in support of his theory he quotes a number of readings which certainly indicate strong δ influence for this ms. It is most probable, however, that N also is to be referred to the mixed group, as Leo¹) noticed. In at least one passage, *And.* 602, N agrees with $\gamma \mu$ in the order *erilem filium*, where D G read wrongly *filium erilem*. Moreover, N with F and Ld alone omits *Haut.* 509-11, and in *Ad.* 156 N with E F Ld has *ilico iam nunc*. Compare also *And.* Prol. 11, *sunt dissimili*: so N with two of Bentley's mss.,²) Regius 15 A XI (Chartaceus) and 15 A VIII.

The fourth of Bethe's mss., Parisinus 7903 (Z), which he connects closely with Ld, I have examined, and find it to be a near relative of E. It should not, therefore, be classed with γ ,³) for in general it follows the majority of the mixed family and inclines now to δ , now to γ . There is no ground for Watson's statement⁴) that Z is a copy either of C or of the parent of C.

The Lipsiensis (L), S. X, was first noticed in print by Otto Brugmann,⁵) who assigned it to the δ family. He was followed by Kauer, who saw in L the best representative of the δ group.⁶) The same scholar, however, in his collation of λ , seems to include L under the designation μ . Dziatzko, who employed L in his edition, had already declared its close relationship to E,⁷) and it is correctly classified as mixed by Hauler and Fairclough.

¹ Götting. Gelehrte Anzeigen, 1903, p. 992.

² Cf. Warren, *A J P*, 3 (1882), 59-71. All of these, with the exception of the Dunelmensis, are to be referred to μ . This is clear from the readings published by Umpfenbach in *Philologus*, 32 (1873), 442-477. Cf. also Fairclough, *Andria*, p. 154.

³ So Hauler, *Phormio*, p. 189, n. 3. Cf. Dziatzko, *Comm. Wölff.* 221.

⁴ *Op. cit.*, p. 168.

⁵ *Fahrb.* 113 (1876), 420, n. 3.

⁶ *Zeitschrift f. d. Österr. Gymn.* 52 (1901), p. 988, in which the writer promises to produce the evidence for his theory.

⁷ *Rhein. Mus.* 39 (1884), 342. The most striking bit of evidence in favor of this classification is the confused order of words in the *Haut.* Didascalia. In this order and in the addition of PRIMA after MENANDRI, E is followed not only by L, but also by H Br Z, and by all the late inferior mss. (cf. Geppert, *op. cit.*). In Z this Didascalia is written on an extra sheet of parchment much smaller than the regular size of the page, but apparently by the first hand.

Finally, of interest in this connection is Parisinus 16235 (Sorbonne 507), *S. X*, which I shall call *K*.¹ Ritschl² published a collation of this ms. for the Prologue and first scene of the *Adelphi*, but since that time no one, so far as I know, has made use of *K* at all. It is correctly ascribed to the mixed group by Hauler in a brief reference.³ While not actually furnished with a series of miniatures, *K* shows descent from an illustrated archetype. There is, indeed, on Fol. 41r a single picture before the *Haut.* prologue, showing a figure seated at a desk. The picture is clearly manufactured and has no connection with the γ tradition, but throughout all the plays a space from nine to eleven lines in length is, with some few exceptions, left before each scene. These spaces were later filled by fragments of Eugraphius' commentary.⁴ There are no scene-headings.

As a basis for a study of the mixed group as a whole I have selected *Haut.* 522-904, in order to have the testimony of λ , and to make use of Kauer's corrections of Umpfenbach's variant readings within these limits. *K* and *Z* I have collated for this passage and have tested Umpfenbach's report of *D* and *E* for the whole of the *Haut.* *F* is, of course, available in the facsimile edition, and I add the evidence of *H Br.* I have gained a firmer hold on the readings of the δ family by supplementing *D* and *G* with Parisinus 10304 (Δ).⁵

¹ The ms. is a large one, 33.8 x 29 cm., of which the writing occupies 22 x 25 cm. The text is written as prose, but from the end of the *Andria* red capitals usually mark the beginning of separate verses, and an attempt is made to have these correspond to the beginning of the lines of the ms. Cf. Geppert, *Serapeum*, 12 (1851), p. 377.

² *Rhein. Mus.* 8 (1852), 291 f.

³ *Phormio*, p. 189, n. 3.

⁴ Cf. *infra*, p. 109.

⁵ Δ is a most important manuscript which has been known only through Fritsch's publication (*Philol.* 32 (1873), 446-460) of a collation of those parts of this ms. coextensive with *V* and *m*. Besides sharing with *A D* the interest arising from Greek *notae*, Δ shows readings which are often preferable to those of *D G*, e. g. *Haut.* 592 *dant*: so Δ alone of the Calliopians; 747 *paulum* *A* Δ ; 783 *ne me*: *me ne* *D G*; 785 *scite poterat*: *poterat scite* *D G*; 723 *induxerunt*: *adduxerunt* *D G E K*; 630 *in animo* omit *D G a*. This ms. thus becomes a useful factor in determining the position of the mixed family, for besides the passages just quoted we find the following in which Δ shows that the reading of $\gamma \mu$ is not peculiar to that branch of the tradition: 601 *haec argenti*: *argenti haec* $\gamma \mu \Delta$; 691 *mihi*: *me* $\gamma \mu \Delta$; 774 *hanc cupere*: *hanc se cupere* $\gamma \mu \Delta$; 873 *scientem*: *sciente* $\gamma \mu \Delta$. These few coincidences need not point

Within these 383 lines of the *Haut.*, μ (E F H Br K Z) agrees with γ (P C O λ Y) against δ (D G Δ) 65 times, but with δ against γ only 10 times, as shown in the following table:

	WRONG	CORRECT	DOUBTFUL	BOTH WRONG	TOTAL
$\gamma \mu \times \delta$	31	25	2	7	65
$\delta \mu \times \gamma$	3	3	3	1	10

Space will not allow me to quote the whole list of coincidences between μ and γ . Suffice it to say that only a few of them can be explained away as glosses which, inserted on the margin or between the lines of an early Callipian manuscript, were variously omitted or inserted by the respective ancestors of γ , δ , and μ , and which would not, therefore, by their presence or absence, indicate any essential relationship between the groups. Of such glosses in δ and not in $\gamma \mu$ we find only the following: 616 *esse* after *videtur* add D G Δ *a* (*esse* deleted in D); 693 *hanc* before *sumo* insert D¹ G Δ ; 743 *sequere hac: sequere me hac* δ ; 803 *conficiam: perficiam* D¹ G Δ ; 862 *perpetuo: in perpetuo* D, in *perpetuum* G Δ ; 874 *ita: tam* D¹ G Δ ; 895 *hoc* before *unum* add D¹ G Δ . Again, the following in $\gamma \mu$ and not in δ : 620 *timeo: metuo*; 659 *potis est: potest*; 673 *esse*; 715 *pendis: curas*; 764 *mihi*; 813 *tu*; 855 *ac: et*.

From these statistics it seems clear that μ took its rise from γ , and we may say that the members of the mixed group all go back to a lost [X¹], which was a copy of [X]. Further evidence in this direction is furnished by the condition of these mss. at the beginning of the *Eunuchus*. E H Br Z lack the Periocha, and there is no trace of the Armarium or Prologue figure.¹ This same loss is sustained by all the γ

to any connection between Δ and γ . They may be due either to accident, or to the presence in an early δ ms. of Callipian variants treated differently by Δ and the ancestor of D G.

¹ The loss of F's testimony here is particularly deplorable, because the number of miniatures in the other illustrated mss. is so far from complete that it is dangerous to draw any conclusion from the absence of the pictures in this place.

group.¹⁾ The prologue is found in all the mixed family, but in Br the Didascalia is inserted between Prol. 30 and 31, showing that in some ancestor of this ms. Prol. 1-30 had been displaced. Since P¹ omits these lines altogether, the confusion in Br emphasizes the close connection of μ with the γ archetype.

To show how slight is the influence of δ on μ as a whole, I will quote the readings by which this influence is indicated:

- (1) *Haut.* 656 *animum: anulum* $\delta \mu$, a variant arising from *anulus* in 653, referred to by *servandum* in 655.
 677 *optume: optume est* $\delta \mu$ (gloss).
 823 *pollicitus . . . unde: es pollicitus . . . unde id* $\delta \mu$ (except H¹ Br¹). The glosses *es* and *id* were also in the γ tradition, as is shown by the fact that they are written between the lines in C by the first hand.
- (2) 682 *quantum audio: quantum ut audio* O C λ , *ut* erased in P Y (gloss).
 677 *euge* omit γ .
 527 *at quasi is: atqui si is* G μ and P Y by erasure (*a//t qui* E, *adqui* F,²⁾ *atq;* M), *adquid si is* P¹ C¹ Y¹ O λ (*atquit* A¹), *quasi* in eras. D², *at is* Δ^1 (*si* added later).²⁾
- (3) 589 *extrudis: extrudas* γ .³⁾
 572 *certe concedas; certe ut concedas* γ .⁴⁾
 870 *haec uti: ut ut istaec* γ (*ut uti* P O, single *ut* Y), *haec ista ut* D K Z L¹ E (*ita*) M H Br, *haec ut ut* Δ , *haec ut* G.⁵⁾
- (4) 611 *qui: atqui* $\delta \mu$ O, *atquin* P¹ C λ Y¹.

¹ The Periocha in N was no doubt derived from some δ source.

² Kauer, p. 116, n. 1, wishes to read *atqui* in preference to the vulgate *at quasi*, which is supported only by D² and Eugraphius. The latter is the reading also of Harl. 2750, and of a later hand of H.

³ Kauer, p. 116, n. 3, accepts *extrudas*.

⁴ P has an erasure of two letters before *concedas*—probably *ut*. Bentley, Dziatzko, Wagner, Fleckeisen¹, Tyrrell, and Ashmore read *ut hinc concedas* (*hinc* omit A $\gamma \mu$), but it seems more likely that *ut* is a gloss.

⁵ Kauer, p. 132 ff., contends for γ 's reading (cf. Ballentine, *Haut.* p. 122). On the other hand, Δ 's is nearer the *haec uti* of A, and *ista* could be a variant on *haec*

So slight is this influence,¹ and so few the cases where μ agrees with δ in an evident *error*, that one might be tempted to say that μ as a whole was not contaminated from δ at all, but derived the good readings in which it agrees with δ , from a γ source superior to that used by C P Y. In that case [X¹] would not be a copy of [X], but would take its rise from a ms. nearer the fountain head of Calliopian tradition. Such an origin of μ seems to be occasionally indicated by the presence in single mixed MSS. of readings superior to those of either δ or γ , e.g. *Haut.* 831 *i*: so M alone,² *ii* A, *ei* Calliopius (D¹ possibly *ii*); 503 *ita*: so A E¹ F¹; E alone of the Calliopians has correctly *si* in *Haut.* 45, *mihi* in 39 (*mihi seni* L), *usus homini* in 81, and *minabitur* in 489 (Umpfenbach is wrong about E here);³ *Phorm.* 1022 *quid* A H Br M (E F lacking); *And.* 947 *quid* E H; *And.* 232 *facultatem obsecro* N S; *And.* Prol. 11 *sunt dissimili* N;⁴ *Eun.* 554 *quoquo eam* A L alone (Dziatzko).

But the facts in the case do not seem sufficient to prove the theory I have suggested. Individual μ MSS. may have occasionally made lucky mistakes. Or possibly the δ sources used as models by the correctors of μ represented the Calliopian tradition in purer form than does any existing member of the δ family.

But however closely the mixed family as a whole approaches the γ tradition, its individual members show various degrees of relationship

(cf. *Haut.* 339 *huius*: *istius* D G M). F's rendering also points to *haec ut ut*, with the addition of *ista* interlinear: *haec ut ista ut* (the first *ut* deleted).

¹ The situation is not materially changed if we take into consideration the whole of the *Haut.* For here we find only six additional cases of agreement between δ (D G) and μ (E F H Br): 121 *eis*: *is* P¹ C¹ Y (*iis* O), *his* D μ (merely the addition of the aspirate, possibly accidental); 203 *huncine*: *huncine* D μ (dittography?); 446 *ingratiis*: *ingratis* δ μ O (haplography?); 943 *id mirari*: *id emirari* G μ , *ide mirari* D¹?; 936 *magis vis*: *mavis* γ , *malis* δ μ ; 2, 3 *Syrus Dromo Clitipho Clinia* δ μ , the "normal order" (cf. *infra*, p. 87), changed in γ to agree with the picture.

² Δ also has *i*, but a trace of an erasure after the *nota* may mean that the first hand wrote *ii*.

³ But *minitabitur* is read by Fleckeisen², Tyrrell, and Ashmore. I might add *Haut.* 83 *ei* E, D², with Umpfenbach, Gray, Tyrrell. In *Haut.* 195, E with A and Bentley omits *est*.

On the other hand, E, contrary to Umpfenbach's report, shares the mistakes of the rest of the Calliopians at 265 (*erga te*), 279 (*hinc*), 296 (*ut*).

⁴ Cf. *supra*, p. 67.

with the δ branch. E K Z seem to occupy a middle position. Nearer γ stand F H Br, while M L N incline more to δ . As it happens, this is not so apparent from the portion of the *Haut.* we have been considering. For after eliminating the errors in Umpfenbach's critical apparatus, there remains but one doubtful indication that E is nearer δ than are F H Br: *Haut.* 701 *quin: quid* C¹ P O λ Y H Br, *quid* from *quin* F (F¹ Kauer, F² Umpfenbach). F's hesitation seems to indicate a doublet in the $\gamma \mu$ tradition. But if we take the rest of the *Haut.* into consideration, there is abundant proof of E's contamination:¹⁾

(1) Prol. 1 *sit vestrum: vestrum sit* E D; 23 *hunc se applicasse musicum: se applicasse hunc musicum* γ F H Br (*se* is repeated by F before *ad studium*, but deleted). E has with D the correct order, but shows the transposition marks which occasioned the change in γ F H Br;²⁾ 134 *hinc eieci: eieci hinc* D E; 139 *parcens quaerens: quaerens parcens* D E M; 153 *illum satis: satis illum* D E M; 158 *maximum: maxime* D E¹; 382 *isti omit* D E G, possibly by haplography, as *studuisti* precedes; 979 *alienavit: abalienavit* D G E M; 939 *est* (gloss) added by D G E (*minus est* D G, *est minus* E).

(2) 72 *enim dices: dices enim* γ F H Br;³⁾ 75 *tantumne ab re tua est otii tibi:* so D E¹ M; 77 *nihil a me: a me nihil* γ F H Br; 81 *se ut: ut se* γ F H Br (and Fleckeisen²⁾); 90 *me omit* γ F H Br; 153 *nec: neque* γ F H Br M; 161 *faxint: faciant* γ F H Br; 161 *commodum est: est commodum* γ F H Br; 170 *ut* (gloss) add γ F H Br; 176 *ego* (gloss) add γ F H Br; 217 *mihi: mihi* γ H Br and *F* in erasure, — *n* is added in *E* by a later hand; 208 *ubi animus: animus ubi* γ F H Br; 424 *et om.* γ F H Br; 2, 4 A D G E M have the "normal order" *Bacchis Antiphila Clinia Syrus*, while *F* agrees with P C O in inserting *Clitipho* between *Clinia* and *Syrus*. H has no scene-heading here, while Br, as is its wont, writes only the first name *Bacchis*; 909 *vix mihi: mihi vix* γ F H Br; 999 *scio:* so A D G E M; 1051 *id omit* γ H Br, interlin. F, probably by a later hand.

H Br seem therefore not to share much of the contaminating influence which in the *Haut.* affected all the mixed mss. except F, and this fact increases the value of H Br as indicating with fair certainty the

¹ Here I use my own collations of E F D, but cannot add the testimony of K Z.

² Cf. Kauer, p. 128, n. 2.

³ *F*, with the rest of the Calliopians, writes *me* before *quantum*.

readings of F in those considerable portions of the text which F has lost. There are, however, some passages where F seems to be nearer to γ than are H Br:

237 *scis*: *scias* D E H Br; 261 *dolet* (gloss) omit F γ ; 403 *intuitur*: *intuetur* D E H Br; 605 *Cliniam*: so P¹ C¹ Y¹ F;¹⁾ 977 *neque tibi nec tibi*: *nec tibi nec huic* δ E H Br M O;¹⁾ 1050 *exorent*: *exorem* D E H Br, *exorem* from *exorent* F¹ (?); 361 *SY. Perdocta*: *CLIT. Perdocta* P C¹ Y O¹ F¹; 648 *quidquid*: *quid* γ F¹; 881 *nisi idem*: *nisi si idem* γ F K L Z (*si* interlin. in E, apparently by a later hand); 980 *fame*: *a fame* γ F (//// *fame* P, possibly P¹ had *ab*); 985 *quid*: *qui*²⁾ P C Y F¹;¹⁾ 1061 *nostri*: *nostrae* P¹ C O Y F.

There are others, on the contrary, which seem to show that H Br are nearer γ than is F: 669 *hac re*: *hercle* E F L Z K G; 738 *facias* (gloss) add δ E F K; 989 *inventa est vera inventa est causa*: *vera inventa est causa* E F (haplography?); 464 *faciat*: *faciet* E F¹; 942 *doti*: *dotis* γ H Br.

Such discrepancies as these are to be explained by supposing that the various members of the mixed group made different use of the interlinear variants which came down from their archetype. We may thus account also for the occasional coincidence of F or H Br with δ , without the support of other μ MSS. Cases of the latter sort are not sufficiently numerous or significant to quote. That F is the least corrupt of the mixed family is indicated by the important testimony of the *Haut.* Didascalia, in which E H Br K³⁾ Z L show the same confused order of words.⁴⁾ Moreover, at *Haut.* 606, F does not share with the other members of its group the mistake of *daturum* for *daturam*. For the most part, however, we find in F the mistakes which are peculiar to μ . Besides those mentioned on pp. 65 f. the following also may be noted:

Haut. 810 *ut*: *et* E F H Br K Z, and D in erasure, perhaps by a later hand; 458 *absumsit*: *adsumpsit* E F, *assumpsit* H Br; 354 *istic*: *istuc* E¹ F H Br; *Phorm.* 61 *verba ei*: *ei verba* E F H Br; *Phorm.* 178 *ei*: *et* E H Br F¹.

¹ Cf. *infra*, p. 94.

² *qui* is adopted by Bentley, Wagner, Fleckeisen.

³ I am not sure that this Didascalia is by the first hand in K.

⁴ Cf. *supra*, p. 67, n. 7.

With E are to be grouped K Z. Besides the case of the *Haut.* Didascalia we may observe: *Haut.* 518 *equidem*: *quidem* E K Z; 853 *omnia* is assigned to *MEN.* by O E K Z Δ (interlin.); the *nota* is interlinear in F in darker ink and in D in lighter red. Both K and Z show the influence of δ in particular readings: 605 *det* omit G α Z¹; 621 *magno iam*: *iam magno* D G Δ α Z; 663 *ni illa*: so A (Hauler) G Δ Z alone; 727 *renuntiarit*: *renunciaverit* D G K; 576 *pudet*: *piget* γ μ except K; 646 *in* omit all MSS. except A D¹ K¹; 898 *tuum*: so A δ K¹. K in particular seems close to E: 676 *nunc* omit E K (*nunc* D — corrected later?); 558 *quid*: *quod* E K¹; 630 *inscitiam*: *inscientiam* D¹ E K; 723 *induxerunt*: *adduxerunt* E K D G; 763 *boni tibi*: *tibi boni* E K Δ; 899 *subolat*: *suboleat* D G Δ E K M (F has *e* interlin., by a later hand according to Warren).

A third group within the mixed class is represented by M, with which are to be joined L and N. We may note the following as instances of δ influence on M alone: 192 *se miserum*: so δ M; 262 *gratum mihi*: so δ M; 331 *tibi vis*: so δ M; 253 *ei esse censes* (edd.) — *esse censes* (MSS.): *esse ea censes* D¹ M; 319 *mitte*: *mitte ista* M D G; 339 *huius modi*: *istius modi* δ M; 358 *istunc*: *istum* G M; 425 *tanto et magis*: *et* om. G M D (D¹ omits *magis* also); 672 *latere tecto*: *latere et tecto* G, *latere tecto et* M F²; 4, 1 G M alone have the order *Chremes Sostrata Syrus Nutrix*, and in 4, 4 *Bacchis Dromo Clinia Syrus Phrygia*.¹

To sum up, the mixed group as a whole is very closely allied to γ, and was derived from an ancestor [X¹], which was probably a copy of [X]. Into [X¹] were entered, as variants, a number of δ readings, which were variously adopted and rejected by the descendants of [X¹]. In respect of the amount of δ influence, the mixed family may be divided into three groups, with increasing evidence of contamination:

¹ It is with G that M seems particularly connected. This was observed by Schlee, although it led him to a wrong conclusion, and is in line with a tendency elsewhere manifested by G, of following the reading of μ against that of δ: e. g. *Haut.* 473 *consusurrant*: *consusurrat* E M G O; 669 *hac re*: *hercle* E F L K Z G; 943 *id mirari*: *id emirari* E F H Br M G¹ (*e* interlin. in D, — first hand?); *And.* 569 *corrigitur*: *corrigetur* E H Br G; 772 *haec*: *hoc* E H Br G; *And.* subscription *FINIT* E H Br M G; *And.* 592 *is* (gloss) add E H Br G; *And.* 577 *suadet*: *persuadet* E H Br S G; *Haut.* 948 *paret*: *praeparet* E H Br G. Is it possible that an ancestor of G may have been contaminated by the incorporation of μ readings?

F H Br, E Z K S Ld, M L N. For the restoration of [X], therefore, the mixed mss. may be considered as affording a source secondary to that of γ , and their readings may be used with discretion. More trust may, of course, be placed in F H Br than in the members of the other two groups.

C AND Y

Let us now revert to the main part of our inquiry and try to determine the interrelationships of the pure γ mss., P C O λ Y, and their respective importance in determining the readings of [X]. P and C show such close connection that they have been almost universally believed to be copies of the same original. This has occasionally been doubted, as by Hoeing¹ and Watson,² but the doubt has remained little more than a conjecture. An examination of Y shows that this doubt was well grounded. In nearly all the places in the *Andria*, *Haut.* and *Phormio*, where P and C differ, Y supports C, while O takes the side of P. Moreover, in that portion of the *Haut.* covered by λ , the latter nearly always falls into line with C Y.

C Y (λ) \times P O

1. Where C Y (λ) are correct:

And. 79 *dein*: *dehinc* P O $\delta \mu$. Compare

70 *huc*: *huic* P O $\delta \mu$, *huic* C (Y lacking).

151 *praescripti*: so C H Br, *praescribti* Y, *praescriptsisti* D E G, *praescriptsisti* O, *praecribsisti* P (*b* from *p*), — *sisti* (*sis* in eras.) may or may not be by P¹.

171 *sequor*: *sequear* P O D E G S Ld N.

204 *sed dico*: *sed hoc dico* P O *hoc* in P deleted by a later hand.

345 *opportune*: so C Y alone.

495 *certe*: *certi* P O.

659 *illam*: *illum* P¹ O¹.

700 *haec*: *hae* P O $\delta \mu$ (*hae*// C).

864 *ego* omit P O. C¹ writes in eras. *SYM. ego iam te* (*nihil audio* is assigned to *DRO.* by C¹ P¹), while P O continue *ego . . . reddam* to the preceding speaker. Y¹ is lacking.³

¹ *Op. cit.*, p. 333, n. 1.

² *Op. cit.*, pp. 167–8.

³ Cf. *infra*, p. 93.

And. 908 *CRI. Simo. SI. men quaeris: CRI. Simo men quaeris*
*C*¹ *Y* (*C*² deletes *CRI. Simo* and writes *SIM.* interlin.),
SIM. Simo men quaeris *P O*, but the *nota* is by a later
 hand in *P* and *Simo* has been erased.¹⁾

Haut. 217 *facili me: so C Y D*¹, *facillime O H*¹ *Br*¹ *M*, *faci// lime*
P F.

410 *luciscit: so C*¹ *Y*, *lucescit P O δ μ C*².

487 *illut: illud C*¹, *illu// Y* (*d* erased), *illum P O δ μ*.

528 *gnatus: natus P O F E Z K*.

545 *fingit: figit O*, *figitⁿ P F* — *n* added by later hands, ap-
 parently.

604 *ea quae: eaque P O D Δ*¹ *α E H Br*.

620 *quid siet: quod siet P*¹ *O K*¹ *Z*¹.

675 *tam: tamen P*¹ (*en* erased) *O F Z*.

678 *argentum: so C Y λ Δ M*, *argumentum O P*¹ *E*¹ *L*¹ *F*
H Br Z K (*vel argumentum λ C*² *D*² on the margin).

715 *fiat: fiet P*¹ *O F H Br K*.

747 *haut scit hoc: haut scit aut P*¹ *O Z*, *hoc* interlin., appar-
 ently *Z*¹ (*hoc* interlin. *C*¹).

870 *haec uti sunt: ut ut istaec sunt C λ Y* (single *ut Y*), *ut*
uti istaec sunt P O.²⁾

Phorm. PROLOGVS C Y D E H Br, omit *P O F G*.

78 *advorsum: adversus P O E F*.

81 *quandam: quondam P*¹ *O*¹.

236 *places: placet P O μ* — *placet* from *places C*, *place// Y*
 — tall letter erased (*placet* — *t* in eras. *D*).

275 *iudicum: iudicium O*, *iudicu// m P* (probably *P*¹ had
iudicium) — *iuditium G*.

441 *adficit: adfecit P D F G* (*O* lacking).

¹ *P*¹ probably left a blank before *Simo*, noticing that *SIM.* was clearly impossible. *CRI.* before *evenit* in 907 is by a later hand in erasure, and before *hic* in 908 *P*¹ wrote *CRI.*, which was later changed to *CRE.*

CRI. Simo is not found in *Δ G B H Br*, and presumably not in *D E*, although Umpfenbach's statement does not make this clear. The reading of *C Y* is evidently correct, and is followed by Bentley, Dziatzko, Spengel, Fleckeisen¹, Wagner, Freeman and Sloman, and Fairclough.

² Cf. *supra*, p. 70.

474 *ecquid*: *etquid* P O δ μ (*ecquid* H).

484 *exit*: *exiit* P O F.

589 *defetiscar*: *defeciscar* P O G E H Br C².

610 *volup est*: so C¹ Y, *volupe est* C² B D E¹ H Br, *voluptas est* P O F G.

619 *eius*: *pius* O P—in P a small *r* is written above, apparently by a later hand, and *eius* is added by a corrector.

621 *sic*: *si* P O D.

630 *victum eum*: *victum*///*eum* P, *victum meum* O M.

712 *dic esse*: *digesse* O P¹.

846 and 929 *tantundem*: *tantumdem* P O.¹

2. Where C Y (λ) are wrong:

And. 181 *interea*: *inter* C¹ Y M (*interea* E G, *inter*//// D Br).²

275 *inmutarier*: *immutareer* C¹ Y.

276 *verear*: *vereor* C Y M H Br. *P* has *or* in *eras.*, possibly by a later hand.

473 *intus*, a stage direction, is written in capitals as part of the *nota* by C Y H. P E G¹ Δ Br (O lacking) write it as part of the text.

496 *re tulit*: *rem tulit* C Y.

498 *et* omit B C Y.

523 *abi intro*: *abintro* C¹ Y¹, corr. C² Y².

589 *vah*: *va* C¹ Y.

594 *ibo*: // *ibo* C Y.

693 *propterea*^{que}: *propterea qui* C¹, *propterea*//// Y, corr. Y².

788 *mi*: *mi* C, *mi*// Y, *mi* P, corr. P².

802 *is est*: *is est Crito* B C Δ D Y² (Y¹ lacking).

Haut. 67 *vesperi*: *vespere* C Y.

69 *fodere*: *foedere* C, *fo*// *dere* Y (*e* *eras.*).

¹ I have omitted the following, which may, however, have confirmatory value: *Phorm.* 112 *postridie*: *posttridie* A P O E Br; 246 *quidquid*: *quicquid* P O δ μ (*quidquid* C Y); so *quicquid* P O F H Br (*quidquid* C Y) at 251, and *quicquid* P O E G Y² at 553; 526 *sterculinum* O P¹, *stercilinum* C¹ Y.

² Conradt's conjecture *interoscitantis*, accepted by Dziatzko, Fleckeisen², Fairclough, Tyrrell, Ashmore, thus gains new support.

836 *pro alimentis: ornamentis* D G E¹ Z¹ H O P¹ (*pro* omitted except in D¹ G Δ¹ F²), *hortamentis* λ,¹ ⁿ*hhortamentis* C¹, // or // *amentis* Y (*t* erased; *n* may be Y¹ or later).

952 *deridiculo: dericulo* C Y. Corr. C², and possibly a later hand in Y.

967 *semper: semperp* C. *semper* from *sempep* by eras. in Y.

Phorm. 248 After *redierit, dum mihi sunt . . . redierit* was repeated by the first hand of C. So in Y we find a long erasure here, and can make out the letters . . . *mihi . . . oda . . . s . . . edieri*.

987 *Nausistrata: nausistra* C¹ D¹ Y¹.

995 *narrat: so* D¹ Y, *narret* P H Br (O lacking), *narret* from *narrat* C.

1016–17 C wrote in reverse order. In Y these two lines are in eras. by a later hand. In P there is no confusion (O lacking).

Without discussing the relative significance of these passages, they seem, taken collectively, to prove that within the limits of the γ family we have two groups: C Y (λ) on the one hand, and P O on the other. Y cannot be a copy of C, as is shown by the number of uncorrected mistakes found in the latter, from which Y is free.² The natural conclusion is, therefore, that C and Y are copies of the same original. P and O, on the other hand, whose very close connection Hoeing has already pointed out, likewise had a common origin, from which P sprung directly, and O indirectly, through a lost [ω]. Now the parent of C Y cannot be [X], since it is far from likely that the mistakes found in these two MSS. alone can be explained as accidental and independent

¹ Above this word λ¹ has *nāt*. Kauer (p. 122) thinks this is λ's attempt to reproduce a correction of *t* to *n*, found in his original. P has ^{pro}*ornamentis* (*n* in eras. by a corrector and *pro* from *t* by a very late hand. P¹ had *n*, which probably suffered two corrections. Δ has *hornamentis*—*n* in eras., by a later hand, as is also *h* interlin. Before this word Δ has *hasce* by a later hand in an erasure of three letters. *ortamentis* K, *t* in eras. by *man. post*.

² Cf. *supra*, pp. 63 f., and the discussion below of discrepancies between C and Y.

errors. For the corresponding reason, neither can [X] be the immediate original of P O. Therefore, we will conclude that from [X] were copied two lost manuscripts, which we may call [X²] and [X³], the former of which was the parent of C Y, and the latter of P [ω].

Assuming the truth of this hypothesis, let us leave for later discussion the relation between P and O, and examine here whatever ground there may be for doubting that C and Y are direct and uncontaminated copies of the same original, [X²].¹ In the first place, there are several cases where C without the support of Y agrees with various other mss. in errors not found in γ , but most of them may be explained as independent mistakes, due to carelessness on the part of the several copyists:

And. 123 *pedisequas*: *pedissequas* B C E H Br, by dittography.

129 *inposita*: *posita* B C D, because *in ignem* just precedes.

699 *poterit*: *potuerit* B C G H Br; but in the next line, where G H Br again have the same mistake, C keeps the correct *poterit*.²

701 *proclivi*: *proclive* δ μ and C, corrected into *proclivi*, apparently by C². The confusion of *i* and *e* is very frequent.³

872 *ah*: *ha* B C D (*aha* G).⁴

¹ For the evidence afforded by the lacuna at *And.* 804, see above, p. 60. So far as I know this lacuna is not marked in C in any such way as we were inclined to believe was done in [X²]. If, however, there were any such signs in its original, we may easily understand how C might fail to copy them.

Again, on p. 59 above, we saw that Y may or may not have had *Eun.* Prol. 31-45, which lines were omitted by C¹. If [X²] contained this passage, it is not improbable that C's copyist, of his own accord, left it out as unintelligible and evidently fragmentary.

² Cf. also *Eun.* 628 *poterit*: *potuerit* D G; *Eun.* 52 *poteris*: *potueris* G.

³ In C we may note the following cases: *And.* 350 *vide*: *vede*; 456 *commovi*: *commove* C¹; 509 *Davi*: *Dave* C¹; *Haut.* 199 *illi*: *ille*; 205 *tolerabilis*: *tolerabiles*; 575 *audeam*: *audiam* C¹; 622 *me*: *me*; 847 *dari*: *dare*; 892 *scilicet* from *scellicet* C.

⁴ For *ah* we find *ha* in C at *And.* 649, B C D P O *And.* 868, D *Phorm.* 503, D E G *Phorm.* 541, V *Ad.* 127. Cf. *Ad.* 132: *a* A P C¹ Δ, *ah* F, *ah* E, *ha* G, *haha* M, *aha* B D V H Br.

Phorm. 105 *aderat: erat* B C D¹ G H. *adiumenti* is the next word.

330 *qui istuc: quid istuc* B C F Br. *qui* and *quid* are often interchanged.¹⁾

Haut. 832 *hac me ocius: so* A Δ G (*hac ocius* D, — *hac* in eras. by a later hand, which also added *nc* interlin.), *me hac nunc ocius* γ μ, but *me* is omitted by C¹ E K. *me* was possibly written above the line in [X¹] and [X²], for it could have been crowded out by *nunc*, which was originally entered as a gloss on *ocius*. Or else its interlinear position was due to construction marks connecting it with *sequere*.

823 *es* before *pollicitus* and *id* after *unde* are glosses found in δ μ. O Y omit them (the whole line is omitted by P¹), but the first hand of C writes them between the lines. No doubt they were so written in [X²] and [X].

914 *ME. Quid ni: MEN. ah quid ni* P O Y H¹ Br¹, *MEN. ahhahe* C¹ and [X²]. In P *quid ni* is in eras. by a later hand, so that possibly [X⁸] also reproduced the *hahe* from [X]. δ and E K Z M read *ahhahe* or *hahahe*, and F has *ahhae* in eras. [X¹] had *hahe* still interlin.

No more significant are the cases of coincidence in error between Y and MSS. of the mixed or δ family:

And. 205 *dices: dicas* Y D¹ G N¹, — *e* and *a*, from similarity of sound, are often confused.²⁾

533 *O* omit G Y.³⁾

652 *cognoris: cognoveris* Y D Δ M.⁴⁾

¹ Cf. *And.* 302 *qui: quid* C; *And.* 575 *qui: qui*// Y (*d* erased); *And.* 934 *qui: quid* A; *Ad.* 99 *qui: quid* O; *And.* 749 *qui: quid* G, corrected into *qui*; *Haut.* 532 *qui: qui*// Z; *Haut.* 642 and 904 *quid: quid* G; *Haut.* 801 *quid: qui* A; *And.* 745 *quid: quid* G (*quid* P¹).

² The scribe of Y makes this mistake in *Phorm.* 909 *animadverterem*, *Phorm.* 685 *narrem* from *narram*, *And.* 909 *negas: nagas*, *Haut.* 1060 *ames: amas*, *And.* 277 *putas: putes*. Instances of this in the other MSS. are also quite numerous.

³ Cf. *Haut.* 684 *O* omit Y; *Haut.* 240 *O* omit γ E H Br; *Phorm.* 853 *O* omit O¹ E.

⁴ The uncontracted forms of the compound tenses are often erroneously substituted. Cf. *Haut.* 584 *indicaverit* G K; *Haut.* 727 *renunciaverit* D G K; *And.* 238 *de-*

- Haut.* 612 *qui istuc: quid istuc* A F K, *qui// istuc* Y (*d* erased).¹
 562 *qui istic: quis* P C O F¹ Z Br, *quid* A¹ Y K E¹ F² (*qui* D H), — *quid istuc* has just preceded, and *quid ego* begins the next line.²
Phorm. 155 *quod: quid* G Y, — the next line begins with *quid*.³
 419 *ne agas: negas* Y D¹ E¹, — merely a confusion of sound.
 658 *istanc: istam* Y D G.⁴

In the same way Y and P occasionally show the same careless error:

- Haut. Per.* 8 *quo: quod* A Y, *quo// P* (*d* erased). The relative is natural after *id factum*, and the mistake in P may have been corrected by the first hand.⁵ It is of course possible that *quod* was found as a variant in [X], [X²], and [X³].
 235 *te omit* P Y, — perhaps because *forte* had just been written.
 586 *lubet: iubet* P¹ Y, — an error due to confusion of letters.⁶

More interesting are the passages in which C or Y retains a correct reading not found in the other members of the γ class, and such pas-

crerat D alone; *Haut.* 1059 *cognoveris* A E; *Haut.* 429 *audivisti* A¹; *Haut.* 527 *novistin* A; *Haut.* 891 *nuntiavisti* A; etc.

¹ Cf. p. 80, n. 1.

² In *And.* 702, moreover, Y writes *quid* for *quis*.

³ The frequent confusion between the relative and the interrogative is no doubt due in part to the similarity of their abbreviations. Instead of *quod*, we find *quid* in Y at *Phorm.* 951, and *Haut.* 888 (corrected into *quod*), in G¹ at *And.* 583, C P O Br *And.* 45, V *And.* 942, C¹ *Haut.* 534, K *Haut.* 760, O *Ad.* 825, 961, etc. For *quid* we find *quod*, e. g. G *Eun.* 290, D *Haut.* 607 (so *And.* 537 and D¹ *Haut.* 759), E *And.* 346 (so *And.* 347, 621, E¹ *Haut.* 569), F¹ K Z *Haut.* 871, E K¹ F² D² *Haut.* 558, E D¹ G Δ K H F² *Haut.* 662.

⁴ *iste* and *istic* in the various cases are often interchanged: *Haut.* 736 *istam: istanc* γ μ ; 869 *istam: istanc* δ ; *Eun.* 494 *istanc: so* A G; *Hec.* 134 *isto: istoc* D O; *Eun.* 705 *isti: istic* O. For *istuc* we find *istud*: *And.* 941 M, *Hec.* 272 E,

Ad. 733 G, *And.* 652 and 663 Y; *Haut.* 775 *istuc: istud*^c Z.

⁵ Cf. *And.* 655 *quo tu: quo//tu* Y; *Haut.* 554 *quo: quod* Call.; *Ad.* 825 *non quo: quod* Call.; *sed quo: quod* all except A D¹ G; *Haut.* 721 *quo: quod* A; *Haut.* 914 *quo: quod* O.

⁶ So Y has *iubet* for *lubet* in *Haut.* 643 and 738. Cf. *Phorm.* 43 *unclatim* from *unclatim* C; *Phorm.* 243 *exilia* from *exilla* C; *Phorm.* 572 *aiebant* from *alebant* C.

sages offer additional evidence of the fact that we have in the C Y λ group the best representative of the original γ tradition. For it is quite easy in most cases to arrive at the readings both of [X²] and of [X], and to show how the discrepancy between C Y arose.

In the first place we may note, for the sake of comparison, a few readings not belonging in this category at all, but rather emphasizing the close connection between C and Y:

And. 242 *quia me: quoniam me* $\gamma \mu$ G, *quoniam* C Y — *m* added interlin. by C¹.

256 *censen me: cens* [&] *in* *me* Y, *censen me, n* in *eras*. C¹.

Probably [X²] had *censen*. Y incorporated the & and wrote *in* for *en* by mistake. C first wrote *censet* and changed it to *censen*.

329 *videam: viam* C Y — Corr. C¹, Y later hand.

552 *Glycerium: glyrium* B C Y, but C¹ adds *ce*.

727 *supsterne: subterne* C Y, corrected, however, by C¹.

Phorm. 271 *rei foret aut: foret rei aut* P¹ O, // // // *foret aut* Y (*rele* or *rela*? erased), *foret reia ut* C (*i* from *l* by erasure). [X²] had probably the correct order, but *rei* (written so as to resemble *rel*) was connected with *aut* by construction marks, which had appeared in [X]¹) and had occasioned the change of order in [X³]. C made the transposition, but connected with *rel* the *a* of *aut*. Y interpreted the marks in the contrary fashion, but took only the *a* instead of the entire word *aut*, which he inconsistently repeated after *foret*.

These passages make it clear that C and Y do not always reproduce in the same way the corrected mistakes of [X²], and so furnish the key for the explanation of other discrepancies, e. g.:

And. 327 *potest: so* D¹ E Δ , *potes* P O Y M H Br G, *potest* C, corr. apparently by C¹. [X] and [X²] *potest*, [X³] and [X¹] *potes*.²⁾

¹ The object of these was, of course, to bring *rei* into juxtaposition with its grammatical parallel *famae*.

² It is, however, possible that C makes a lucky mistake here. Cf. *And.* 333 *potes: potes*// Y; *And.* 647 *es: es* C; *Haut.* 848 *es: est* Z; *Phorm.* 196 *es: est* P¹; *Ad.* 696 *es* from *est* C; *Hec.* 583 *est: es* C¹.

- 289 *oro* interlin. by C¹ and P Y (possibly later hands). O with $\delta \mu$ has the word in its proper place. No doubt *oro* was interlin. in [X], [X²], and [X⁸].
- 577 *queam*: so O $\delta \mu$, *quam* P¹ Y¹, *quem* C¹. [X] and [X²]
^e
quam, Y disregarded the *e*, which C substituted for *a*. In [X⁸] the same alternative was retained.
- 787 *credas*: so C, *credes* D P O, *credaes* Y, *credes*^a [X] and [X²], *credes* [X⁸], *credas* [X¹].
- Haut. Did. 10 *INPARIBVS*: so C¹, *INPARILIBVS* P O Y F C². *LI* interlin. in [X] and [X²].¹⁾
- 333 *sua*: so Y, *suam* O, *sua*// P, *suam* C, corr. apparently C¹. [X] and [X²] *suam*, [X⁸] *suam*, [X¹] *sua*.
- 515 *tardiusculus*: so C, *tardusculus* P O Y. *i* interlin. in [X] and [X²], omitted in [X⁸], incorporated in [X¹].
- 628 *ego*: so A⁸ λ Y, *ego*^r C¹, *ergo* $\delta \mu$. [X] and [X²]^r *ego*, [X¹] and [X⁸] *ergo*.
- 729 *promittit*: *promittet* P¹ O Y λ , *promittet* altered into *promittit* by C. If Kauer is correct in ascribing this change to C¹, no doubt *i* was interlin. in [X²] and [X], correcting the erroneous *e*.
- Phorm. 557 *solae*: so Y, *sola* C¹ P¹ O¹. *e* interlin. in [X] and [X²], omitted by [X⁸].²⁾
- 832 *sumam*: *sumam* from *summam* P C. [X], [X²], [X⁸] *summam*.
- 889 *ipsa*: so Y (O lacking), *ipsa*// P C (*m* erased). [X] and [X²] *ipsam*.

In the last two cases, C and P may very possibly make independent errors, in 832 by dittography of *m*, and in 889 by adding the lineola.³⁾

¹ *PARILIBVS* we find in all the Calliopians in the *Hec. Did.*, but *IMPARIBVS* in that of the *Phorm.*

² The mistake was due in the first instance to the *triginta* immediately following.

³ Mistakes of this kind, arising from a tendency to the nasalization of vowels, are common. Cf. *And.* 359 *ipsa re*: *ipsa η rē* C; *Phorm.* 335 *sententia*: *sententia η* C; *Eun.* 1065 *heia*: *heia η* C; *Phorm.* 544 *causa*: *causa \bar{a}* Y; *Phorm.* 117 *ageret*: *ageret η* C; *Haut.* 242 *sermones*: *sermonēs* Y; *Phorm.* 480 *aiebat*: *aiebant* O; *Eun.*

A similar explanation may account for the confusion in :

And. 268 *diem*: so Y, *die* B C D O P¹ (so Umpfenbach and Warren. I am not sure). [X] and [X²] *diē* (C dropped the lineola), [X³] *die*.

Haut. 289 *mala*:¹ so A O Y M alone. *mala* in [X], [X²] and [X³], and C and P add the lineola, or else *malam*, and Y and O (or [ω]) drop it, possibly under the influence of *nulla* and *re*.

Other discrepancies may be accounted for by the presence in [X²] of variant readings, which arose from the incorporation of glosses. We have already noticed (p. 80) two cases where this is evident: *Haut.* 823 and 914.

Consider in this connection :

Haut. 1044 *capiam*: so Y alone. A E F P O have *incipiam*, D G Δ *inveniam*, and B C H Br *incapiam*. [X²] read *capiam*, with *incipiam* or *in* above the line. This goes back to [X], and in [X³] took the place of *capiam*. [X¹], as H Br show, retained the *capiam*, but reproduced the gloss also.

And. 349 *paves*: so Y D¹ Δ m, *caves* O P¹ (^p*caves* P, *s* in eras. by corrector, and *p* added apparently by a later hand), *cave* C, — no doubt a variant on the *paves* of [X²].² [X] had as a variant either *caves* or *cave*, and hence the mistake of [X³]. The *praecaves* of μ arose from ^p*caves*.

Phorm. 333 *abradi*: so Y δ μ, *abripi* C P O, but C¹ P¹ write *abradi* on the margin. Clearly we have here a doublet in [X], [X²], and [X³].

552 *vita*: *ultā* O; *Eun.* 777 *huc*: *hunc* O; *Phorm.* 818 *tutus* and *locus* from *tutum* and *locum* C; *Phorm.* 890 *gestus*: *gestum* Y¹. And for the omission of the nasal cf. *Phorm.* 66 *Lemnum*: *Lenum* P¹; *Phorm.* 63 *Chremem*: *Chreme* C¹; *Phorm.* 360 *audaciam*: *audatia* O; *And.* 212 *fallaciam*: *fallacia* Y.

¹ This is probably correct, although the puzzle has never been satisfactorily solved.

² Cf. *Haut.* 235 *caves*: *cave* E D², *cave*// H. Originally *caves* may have been a corruption of *paves*; arising from a confusion of letters.

519 *es dignus*: so Y A δ H Br, *es*// *dignus* C O, *est dignu*// P (*m* erased, and ~ added by P²). *est dignum* (so E) was probably a variant in [X], and *est* in [X²]; [X³] accepted *est* in place of *es*, and possibly preserved the *dignum*, which may have been written by P¹. It is possible that *est* was a careless mistake in C and [X³]¹) and that this gave rise to a second error of *dignum* for *dignus*, made independently in P and E.

In the same way, though the evidence is not so clear, we may explain the correct *factum* in Y E H Br at *Haut.* Per. 8, for which C P O F Z write *factum*, and the correct *extraham* in Y at *Phorm.* 181 for the *abstraham* of C O P H Br (in P *extraham* is written on the margin, possibly by the first hand).

In very nearly all the cases, therefore, in which Y maintains a correct reading not found in C, we see that it does so as a result of the scribe's habit of disregarding, on the one hand, interlinear variants, and on the other, of carrying out corrections suggested in the form of deletions. How this habit led him into error occasionally, we saw on p. 82. The copyist of C, on the contrary, wrote rapidly, reproducing the corrected errors of [X²] just as he found them, and freely accepting interlinear variants. He is at the same time the more independent and the more careless of the two.

Before closing the question of the relation between C and Y, I wish to add the important testimony of the scene-headings. Watson gave the whole subject a very extensive and careful treatment, and was led to the conclusion²) that C and P were not copies of the same archetype. Now that we have reached the same conclusion, proceeding by a different line of approach, we may, for our own purposes, summarize the evidence in a slightly different way. Leaving out of account the arbitrary and more or less habitual variations shown by the several MSS. in the method of writing the rôles of the characters, and considering only the order of names, we find only one instance of serious disagreement between C and Y:

¹ Cf. *supra*, p. 82, n. 2.

² Cf. *supra*, p. 75.

Haut. 5, 1 *Menedemus Chremes* A C λ Y E G M Z, *Menedemus Chremes Clitipho Syrus* P F O D. Picture of four figures in P F O, of two in C.

5, 2 *Clitipho Menedemus Chremes Syrus* A γ μ G, except that Y omits *Syrus*. (In F and H no scene-heading.) No space in P F O Y. Picture of four figures in C.

The picture of four figures in P F O at 5, 1, is evidently unsuitable, and had its origin, according to Kauer,¹ in a combination of the original picture, which represented *Menedemus* and *Chremes*, with the figures of *Clitipho* and *Syrus*, imported from l. 980. This combination resulted in the loss of the picture at 5, 2, in which the same four characters appeared in a different grouping. Accepting the truth of this hypothesis, we may suppose that in [X] a space was left at 5, 2, and that at 5, 1, there was a picture of four figures, divided more or less distinctly into two groups, with a scene-heading applicable only to the original group. The artist of [X³] completely fused the two groups, supplying names for *Clitipho* and *Syrus*, and left no space at 5, 2. [X²], on the other hand, copied the miniature at 5, 1, in such a manner as to leave its composite nature still evident, and also reproduced the space at 5, 2. Y and λ naturally took over at 5, 1, the heading *Menedemus Chremes*, and Y, sparing as usual, left no space at 5, 2. But C, observing that the hybrid miniature at 5, 1, was out of place, transferred the four figures to 5, 2, with such changes as the new situation required. The elderly *Menedemus* became the youthful *Clitipho*, *Clitipho* was turned into *Chremes*, to *Chremes* was given the name of *Menedemus*, and *Syrus* remained unchanged. Finally, in order to supply a picture for 5, 1, C found it easy, as Bethe² suggests, to imitate the group of *Menedemus Chremes* found at 4, 8. This seems to be a startling innovation, but

¹ *Op. cit.*, p. 123, n. 1.

² *Op. cit.*, p. 43. If we may trust the evidence of Cocquelines' illustrations (Paris 1768), for which the Vatican miniatures furnished the models, the pictures in C at 4, 8, and 5, 1, are strikingly similar. In the latter case, however, the gestures do not suit the situation, since the relative attitudes of the two old men have been in the mean time completely reversed.

On the other hand, we cannot suppose that C's picture at 5, 1 is only a reproduction of the genuine part of the picture in [X] at this point. For the first two figures in P O F here are altogether different from C's miniature.

we have already observed in C a marked tendency to the independent treatment of his original.

From this disposition of an apparent difficulty, let us pass to a summary of the testimony offered by the scene-headings of all six plays. In the arrangement of names, two principles are followed, as Watson shows, the "picture order," and the "normal order." The former is determined, of course, by the grouping of figures in the miniatures; the "normal order" depends upon the order in which the various speakers appear in the scene, except when this is disregarded for the purpose of grouping characters which have the same rôle,—*servi*, *senes*, etc. Now in all the headings where C Y (λ) differ from P O, the latter show the picture order, whereas C Y (λ) follow the normal order.

And. 2, 1 *Charinus Pamphilus Byrria* C¹ D G.¹⁾

2, 6 *Davus Simo* C¹ (Kauer and Watson) D G Δ H Br.¹⁾

Haut. 4, 4 *Bacchis Clinia Syrus Dromo Phrygia* C¹ Y λ.²⁾

4, 7 *Chremes Syrus Clitipho* C¹ λ Y E G M Z.³⁾

Ad. 2, 1 *Sannio Aeschinus Parmeno* C¹ (Kauer) Y D G.

Phorm. 2, 1 *Demipho Geta Phaedria* C¹ (Kauer) Y E M.

3, 4 *Demipho Geta Cratinus Hegio Crito* C¹ Y E D.⁴⁾

4, 5 *Demipho Chremes Geta* C Y M D.⁵⁾

5, 6 *Geta Phormio Antipho* C¹ (Kauer) Y.⁶⁾

5, 8 *Demipho Chremes Phormio* C¹ Y A M E¹.

The only exception to this rule is *Ad.* 365, where neither the *Syrus Demea* of C Y E F D, nor the *Dromo Syrus Demea* of P O are in the normal order (i. e. *Demea Syrus Dromo*). But the fact remains that C Y do *not* have the picture order, which is found in P O.

¹ No scene-heading in Y.

² In the normal order the last two names should be reversed, but the picture order of P O is markedly different: *Bacchis Phrygia Clinia Dromo Syrus*.

³ P¹ omits the heading, but O has the picture order.

⁴ As is apparent from the facsimile, C has *Geta Demipho* in eras. by a later hand. Cf. Kauer, p. 120, n. 1.

⁵ The characters speak in the order *Dem.*, *Geta*, *Chr.*, but this arrangement is disturbed in order to group *Dem.* and *Chr.*, the two *senes*.

⁶ Here the grouping in the miniature corresponds to the order in which the characters speak in the dialogue, but still C Y may be said to have the normal order, grouping in 5, 6, *Geta* and *Phormio*, and in 5, 8, *Demipho* and *Chremes*.

In general, therefore, it seems that $[X^2]$ maintained the normal order, which in $[X^3]$ was shifted so as to make the names correspond to the figures in the miniatures. However, in one case $[X^3]$ agreed with $[X^2]$ in a heading which will not apply to the picture: *Hec.* 3, 4, where there are four figures in the pictures, but only three names in the headings. On the other hand, in six cases where normal and picture order differ, $[X^2]$ as well as $[X^3]$ showed the latter:

And. 3, 2 normal order in D G Δ B H (no heading in Y).

Ad. 2, 4 no MS. has the normal order.

5, 7 A alone has the normal order.

5, 9 E alone has the normal order. (P has only two of the four names.)

Phorm. 5, 9 no MS. has the normal order.

4, 3 normal order in A E M.

Perhaps we may conclude that $[X]$ had the scene-headings in the normal order for the most part, and that where this differed from the picture order, the latter was effected by the insertion of transposition marks. In accordance with these, the names in $[X^3]$ were shifted, but the marks were neglected by the scribe who copied $[X^2]$. It will be observed that this suggestion is in line with the theory of Leo,¹ that the illustrations were copied from some ancient original into a MS. of the γ family. If we suppose this MS. to have been our $[X]$, it is natural that just such a state of affairs should result as we have found reason to believe existed in the archetype.

At any rate, a consideration of the scene-headings adds strong confirmation to our hypothesis that there are two branches of the γ family, that C and Y, representing one of these branches, are both direct and uncontaminated copies of the same archetype, $[X^2]$, and that $[X^2]$ indicates more truthfully than $[X^3]$ the original γ tradition.

THE LUGDUNENSIS

From the readings already quoted it seems clear that this fragment of the *Haut.* belongs to the group C Y. Kauer claims for λ precedence over the other members of the γ family. Is λ 's excellence sufficiently

¹ *Rhein. Mus.* 38 (1883), 317 ff. Cf. Rand, *op. cit.*, p. 365, n. 2.

accounted for by the great care with which the MS. was written,¹ or must we believe that λ 's tradition is purer than that of C and Y?

In two places Kauer maintains that λ is correct against all the other MSS.: *Haut.* 795 and 818. In the first of these lines *illud* has been corrected by λ^1 into *illuc*. There seems to be too much variation in the orthography of these pronominal forms for us to be sure that *illuc* should be the spelling here.² The latter may be merely a whim of the scribe, or he may ignorantly imitate the *illuc* of 793. Again, in *Haut.* 818 Kauer thinks that order is brought out of the confusion that has hitherto existed here, by adopting the *nunc* erased in λ between *abisti* and *mihi*. If this is the correct reading, the word may have been interlin. in $[X^2]$, as Kauer shows how frequently *nunc* is erroneously dropped or inserted. But it is at least possible that the scribe wrote it here carelessly, because of the ending *nunc mihi* of 820. To be compared with these cases is *Haut.* 811, where the gloss *tuo*, read by all the Calliopians, is written between the lines by λ . Unless this be merely an accident, the word may have been so written in $[X^2]$.

Occasionally λ with other MSS. has the correct reading against C Y:

Haut. 606 *et poscit*: *poscet* P O D¹ M E Br K Z and Δ in eras. by later hand, *poscit* λ A F H D² Z² Δ^2 , and Y by erasure from *poscet*, *posciet* C. The possibility of the confusion of *e* and *i*, to which all manuscripts are prone,³ is facilitated here by the assonance of the preceding *et*. But, in view of C's reading, it is probable that $[X^2]$ had *e* corrected by an interlinear *i*. We cannot be sure whether this corruption went back to $[X]$ or whether $[X^2]$ erred independently.

788 *quam*: *cum* P¹ O λ D¹ G (///// Δ), *tum* C Y μ . A doublet in $[X^2]$ and $[X]$; $[X^3]$ chose *cum*, $[X^1]$ *tum*. The incorrect *tum* arose by confusion of letters, or else by deliberate emendation, since the meaning had been obscured by the corruption of *quam* into *cum*.

¹ Cf. *supra*, p. 63.

² A, for instance, has *illud* in *Eun.* 782, 833 (*illui*), *Ad.* 228, 766; cf. *supra*, p. 81, n. 4.

³ Cf. p. 79 and n. 3.

555 *nequid*: so A $\lambda \Delta^1$ K. This is scarcely more than an orthographical variation, and hence not significant. Cf. *it* and *id*, *illut* and *illud*, *haut* and *haud*, *inquit* and *inquid*, *quot* and *quod*, etc.

On the other hand, λ sometimes fails to reproduce a correct γ reading. Besides λ 's independent mistakes, to which should be added *Haut.* 546 *adulescentuli*: *adulescenti* A λ , we may consider:

Haut. 790 *aliquid*: so A D^1 G Δ , *aliud* P C O μ , *aliquod* λ , *aliu* ud d Y (u made from q , and d added by a later hand, apparently). $[X^2]$ no doubt reproduced from $[X]$ *aliquid*, with the variant *aliud*, which was adopted by $[X^3]$ and $[X^1]$. Y^1 , as usual, disregarded the variant, C made the substitution, and λ kept both forms, writing, however, *aliquod* instead of *aliquid*.¹⁾

825 *ego homo sum fortunatus; deamo te: ego fortunatus*

homo sum P C O F Z K L (*forunatis* C), (*homo sum fortunatus* D G Δ H Br, *homo fortunatus sum* E, *sum homo fortunatus* A), *ego fortunatus homo desum*

amo te Y^1 , *ego sum defortunatus homo: amo te* λ^1 . Kauer²⁾ is probably right in supposing that the original order was that of P C O, etc., with construction marks connecting *ego* and *sum*. This caused *sum* to be written interlin., and so gave rise to the variations in μ . Suppose in $[X^2]$ the words were written in some such way

as: *ego fortunatus homo* $\overset{\text{sum}}{\mid}$ \parallel *de amo te*. C, following the marks, writes *sum* after *homo*; Y writes *sum* after *de* instead of before it. λ transposes *de* to a place after *sum*, but, not satisfied with this, writes the meaningless *sum de* above the line, nearer the original position of *de*.

Finally, in connection with the scene-heading of *Haut.* 4, 4,³⁾ λ may give us an exact reproduction of $[X^2]$. As I have already shown, the

¹ Cf. p. 81, n. 3.

² *Op. cit.*, p. 128, n. 2.

³ Cf. above, p. 87.

normal order is followed here by C¹ Y λ, with *Phrygia* in the last place, although in the picture *Phrygia* is the second figure, next to *Clinia*. It is noteworthy that the first hand of λ has transposition signs between the lines, indicating the proper position of *Phrygia*. If these signs go back not only to [X²] but also to [X], we have here an interesting confirmation of our theory regarding the status of scene-headings in the γ archetype.

[X²]

It seems, therefore, that the instances of disagreement between λ and C Y strengthen rather than weaken the bond of connection between these three MSS., and I see nothing to show that λ is not a third copy of [X²]. In that case, the age of λ, which, according to Kauer, was written in the eighth century, increases the dignity of this branch of γ. The number of mistakes shown by all three MSS. in the division of words makes it necessary to suppose that [X²] was written in *scriptura continua*. The manuscript clearly had verse distinction, for whole lines are omitted by C in two places, *Phorm.* 242 and *Haut.* 496, and moreover λ, although, like C, it is written as prose, indicates by a certain sign the beginning of each verse in its original. Y omits lines in three places, *Eun.* 850, *Phorm.* 374, *Hec.* 691-2, but in each case the error might be accounted for by homoioteleuton.

There is no proof that the scholia found in C and λ, even if they are by the first hands,¹ were taken from [X²]. In view of the influence exerted by the mixed group as furnishing models for the later hands of P, C, and D,² it is probable that we are to look there also for the source of these scholia in γ.³ There were, however, a few doublet or variant readings in [X²], which were either handed down from [X], or else introduced independently into [X²] by some commentator.⁴

¹ Rand (*op. cit.*, p. 367) thinks they may be by C¹. Schlee (p. 38) believes they were added later, and Umpfenbach (*Praef.*, p. xxvii f.) is in doubt. That they are by the first hand in λ is an inference by Kauer (p. 115) from the similarity of ink. Y's scholia are clearly by a later hand.

² Cf. *infra*, p. 96 and n. 1.

³ Cf. Rand's theory (p. 388) that the *Com. Br.* was originally written for a MS. of the mixed class.

⁴ In addition to those already noted, the *etiam* of C at *And.* 659 should be mentioned, and the *et* at *Phorm.* 245. Y's *sufficere* for *sufferre* in *Haut.* 453 also represents a gloss in [X²].

There is no evidence that any MS. of μ or δ was used as a source for these, and it is largely this freedom from a suspicion of contamination which contributes to the trustworthiness of $[X^2]$ as an authority for the readings of $[X]$.

P AND O

Turning now to the other branch of the γ tradition, let us examine the relation to $[X]$ of P and O. Here we meet at once with a difficulty. If, as we found it necessary to believe, these two manuscripts are copies, the one direct and the other indirect, of a lost $[X^3]$, from what source, we may ask, did O derive *And.* 804–853 together with the pictures at 5, 1 and 5, 2, — a passage omitted by the first hands of C P Y,¹⁾ and therefore lost in $[X]$ before $[X^2]$ or $[X^3]$ was copied? For the two pictures here are clearly a part of the whole series of ancient miniatures, and I agree with Hoeing in thinking that it is impossible to believe them to have been manufactured by O or $[\omega]$. The natural conclusion seems to be that the passage, with its pictures, was supplied in $[\omega]$ from some other illustrated MS. Do we find in the text of O any further indication that its original was subjected to some outside influence?

Hoeing²⁾ gives a list of eight readings in which O agrees with δ MSS. against γ , and concludes that $[\omega]$ was to a minor degree contaminated from some δ source. In a foot-note is quoted the opinion of Professor Warren that these coincidences might be accounted for by supposing alternate readings to have been entered as glosses in $[X]$, and preferred by the scribe who copied O's original. This is, of course, possible, and remains so if for $[X]$ we substitute $[X^3]$. But the theory of contamination is strengthened by many passages which Hoeing fails to quote, and the number and nature of these force the conclusion that $[\omega]$ was the recipient of some non- γ influence.

1. O correct against C P Y:³⁾

¹ On the loss of *And.* 797–871 in Y, see above, p. 60.

² *Op. cit.*, pp. 328–9.

³ I have not included here *And.* 449 *puerile*: so O δ μ , *puerile*^l P, *pueri*// le C, *puer*//
ile est Y, corr. Y². If P¹ added the extra *l*, perhaps the mistake goes back to $[X]$. In that case $[X^3]$ imitated the latter in writing *l* interlin., and $[X^2]$ made it part of the word. O therefore need not have used a different source for the correct reading.

- And.* 121 *quae: quia* C Y, *que*// P (*e* from *i*, probably by a later hand), *quae* O $\delta \mu$.
 238 *decrerat: decreverat* O $\delta \mu$, *decreberat* Y, *decreverat* from *decreberat* C P².
 238 *hodie* omit C¹ P¹ Y, not so O $\delta \mu$.
 320 *consili: so* O $\delta \mu$, *consilii*// P C Y.
 356 *ascendo: escendo* C¹ P¹ Y Δ , *ascendo* O C² P² and the rest.
 515 *accersitum: so* O $\delta \mu$, *arcessitum* B P C Y.
 536 *paucis: paucas* C¹ P¹ Y¹, *paucis* O $\delta \mu$ C² P² Y schol.
 863-4 *SI. nihil audio . . . DA. tamen etsi: DRO. nihil audio . . . CHR. tamen etsi* C¹ P¹ H Br (Y¹ lacking).¹ O has these *notae*, but also by the first hand, *SIM.* on the margin, and *DAV.* interlinear.¹
Haut. 174 *quisnam: quinam* C P Y H Br E¹, *quisnam* O D¹,
^s
quinam F, corr. F²?
 343-4 *SYR.* before *dic* and *CLIT.* before *verum* have been erased in C P Y. These *notae* do not appear in O, although a space has been left before *dic*.
Phorm. 65 *senibus: so* O $\delta \mu$, and C P Y by eras. from *sensibus*.
 246 *omne: omnem* Y, *omne*// P, *omnem* C.
 559 *GE. iam feres. sed opus est: so* O $\delta \mu$. *GET. iam*
^s
ferres est PHA. iam fere sed opus est C¹. *GET. iam feres est GET. iam fer*// *sed opus est* P¹. Y has *GET. iam feres sed opus est*, with a long erasure between *feres* and *sed*. A trace of red in the middle of this would make it appear that Y¹ had the nota *GET*. In that case, the *PHA.* of C may be an independent variation.

2. O agrees with other MSS. in error against C P Y:

And. 191 *hoc quid sit* is given to Davus by O P² C² B.

604 *astutias: astutia* O $\delta \mu$, *astutias* C, *astutia*// P Y.

¹ P² writes *DAV.* in erasure before *tamen etsi*, but of the earlier nota, the letter C and two others in red are partly visible. C² also substitutes *DAV.* at this point by writing it in black above the red *CHR.* of C¹. The first hand of C writes *SYM. ego iam te* in erasure. Cf. *supra*, p. 75.

- 511-516 *DA. audiui* . . . *SI. quid ais:* so $C^1 P^1 Y.^1$ O
has with D E G^1 H Br C^2 *SIM.* before *multa* (511)
and *DAV.* before *hoc* (516).
- 709 *incipit mihi: mihi incipit* O D E G H.
- Haut.* 446 *ingratiis: ingratiss* O $\delta \mu C^2$, *ingrat//is* Y.
- 473 *consusurrant: consusurrat* O E G M, *consusurra//t* P Y.
- 605 *Cliniam: Clinia* O δ E H Br M K Z, *Clinia* from *Clin-*
iam C F P Y, *Cliniam* λ .
- 611 *qui: atqui* O $\delta \mu P^2$, *atquin* $P^1 C \lambda$, *atqui//* Y.
- 696 *hic: hinc* $P^1 \lambda F Y$, *hinc* $C.^2$ *hic* O and the rest.
- 851 The long scholium after *erravi*, quoted by Umpfenbach,
is part of the text by the first hand in O D E Δ K Z.
- 853 *CH. et tu credis omnia. et illum: CH. et tu credis*
MEN. omnia CH. et illum O E F K Z P^2 . (In F
MEN. is interlin. in darker ink; Δ has both *notae*
interlin., and so D in lighter red).
- 925 *sentiati: ut sentiati* D G O (*ut* D, *senciati* G).
- 977 *neque tibi nec tibi: nec tibi nec huic* O $\delta \mu P^2$.
- 985 *quid istuc: qui istuc* B C P Y F^1 , *quid istuc* O and the
rest.³⁾
- Phorm.* 73 *usus:* so $D^1 P Y$, *usus* C, *usu* O F H Br (*per usum* E
G, *usum* M).
- 227 *potest: potes* O E F H Br.
- 262 *me omit* O $\delta \mu$.
- 339 *asymbolum: adsy(i)mbolum* O $\delta \mu P^2$.
- 478 *eu: eheu* O E F C^2 (*heu* P $C^1 Y$ G H Br).

¹ In P there are traces of more than one corrector. *SIM.* before *unde* (511) is brown and in erasure of red letters. (*S* is partly visible), as is also *Davus* before *audiui* (511), the *vus* being added much later by the hand which also wrote *Symo* in erasure above *mulla*, and *Davus* in erasure before *hoc* (516).

² Kauer reports that *n* is deleted by C^1 . It is, of course, impossible to be certain in cases of this kind, and I have included the passage here because it is precisely similar to many others under consideration.

³ Bentley, Fleckeisen, Wagner, read *qui*.

718 *GE. rem . . . DE. duc*: Besides these *notae*, O¹ has written above in red ink *DEM.* and *CHR.* In *G rem* is given to Demipho, and the nota before *duc* has been erased. *D* has *B* before *rem* and *E* before *duc* in the hand of the Scholiast.¹⁾

850 *vapula: vapulabis* O $\delta \mu$ Y² C late hand, *vapulabo* P² C².

930 *in: i* O $\delta \mu$, *i*// P C Y.

To these may be added four readings quoted by Hoeing,²⁾ in which O incorporates certain glosses: *Eun.* 44 *animadvertite* D E G O;³⁾ *Hec.* 64 *te* D E F Br O P²; *Ad.* 395 *futilis* D E F G O C² P late hand; *Ad.* 854 *opus* and *hilarem* D E G Δ m⁴⁾ O F² P late hand; and finally this striking case from *Eun.* 699: *nec . . . dicier* omit C¹ P¹.⁵⁾ O has the sentence with $\delta \mu$, but omits by oversight *umquam* before *audieram*.⁶⁾

In many of these cases it will be observed that P C Y have been altered by deletion or erasure to agree with the reading of O, and it is possible that O may be reproducing the corrected text of [X³] and [X]. But such an explanation is not probable when we consider the similarity of these cases to the others in which alterations are clearly not made by the first hands of P C Y. The conclusion, therefore,

¹ See Umpfenbach, *Addenda*, p. lxxxviii.

² *Op. cit.*, pp. 328-9.

³ C has this word as a variant, but the whole *Eun.* Prol. is by a later hand in this MS. The *animadvertite* of P is also a later addition.

⁴ I have used this designation for the Cologne Fragment in order to distinguish it from the Monacensis (M). Cf. Schmitz, *Jahrb.* 97 (1868), 652 ff., and Fritsch, *Philol.* 32 (1873), 454 ff.

⁵ Hoeing, p. 322.

⁶ I have omitted from my list the following coincidences, which may be due to accident: *And.* 518 *extemplo: extimpro* O E; *And.* 946 *milies* from *miliens* C², *milie//s* P (Y lacking), *milies* O $\delta \mu$; *Phorm.* 487 *milliens* C, *millie//s* P, *mi// lie//s* Y, *milie//s* Δ , *milies* O F H Br (*s* in eras. by O²); *And.* 967 *na//ctus* P C, *nactus* O V Δ M H Br; *Haut.* 485 *putabit: putavit* O A M E¹; *Haut.* 601 *drachmarum: dragmarum* O Z G H Br; *Haut.* 401 *hocine: hoccine* O E F H Br; *Phorm.* 589 *experirier: experier* M O¹, cf. E; *Phorm.* 346 *coitiost: so* Y, *coitiost* C P (apparently by a later hand in P), *coitio est* O $\delta \mu$; *Phorm.* 789 *eis: iis* A C¹ P¹ Y¹, *his* O $\delta \mu$; *And.* 33 *iis* C¹ P, *his* O G H M; *Haut.* 501 *is* C¹ P¹ Y, *his* O G α E F P² C².

seems plausible that O has suffered, through [ω], corrections from the same source used by the correctors of P C Y. This influence came, however, not from δ, as Hoëing believes, but from μ. In only one case quoted above does O have a reading found in δ alone,—the gloss *ut* in *Haut.* 925, which may very naturally have been found in some mixed ms.; but, on the other hand, O's reading in several cases is found in μ alone. This theory is strengthened by the fact that there is evidence elsewhere to show that mss. of the *mixed group* were used as models by later hands of P C Y.¹ Taking all this into consideration, we are warranted, it seems to me, in concluding that [ω] was contaminated from some illustrated mixed ms. which also supplied for [ω] the text of *And.* 804–853 and *Eun.* Prol. 1–30,² and the pictures at *And.* 5, 1 and 5, 2.

Turning to P, we find its status to be clearly different in this respect from that of O. There are, however, a few readings which may indicate that P is not altogether uncontaminated: *Phorm.* 62 *dico: dabo* P E; *Phorm.* 586 *fit: scit* P E¹ F H Br (*sciet* H). Both *dabo* and *scit* are glosses which are peculiar to μ. The same may be true of *sunt* for *sint* in P E Br (not C or F) at *Phorm.* 125, although *i* for *u* is a frequent error.³ In *And.* 665 for *hoc est*, P H Br and Bentley's *Regius*

¹ Among many indications of this fact, consider the following: *And.* 319 *advenio: advenio* C, *venio* H Br; 329 *proficiscor: proficiscar* E P²; 559 *reducunt: reducant* C² Y² E H; 723 *malitia: militia* C² H Br; *Haut.* 240 *conantur: comantur* P² Petrensis (cf. *supra*, p. 67, n. 2); 606 *daturam: daturum* E H Br K Z M P² Δ² D² F²; 368 *hoc: ob hoc* E H Br F² C² D²; 716 *aetatem: tandem* E F K Z P² C² D²; 813 *ibin: is* A C¹ P¹ λ O Y¹, *ii* G Δ¹ (*in* D² *in* eras.), *i* μ C² P² Y²; 891 *desponsam: desponsatam* P² H; 979 *tibi: sibi* E H P²; *Eun.* 269 *hisce: hice* Petrensis, *hi//ce* P C; *Phorm.* 209 *abeo: abeam* H Br P²; 519 *dignus: dignū//* P, *lineola* add. P², *dignum* E; 661 *pignori: pignerī* E P² (?); 719 *abit: abeat* P² C², *abit* from *abeat* F; 709 *quid* add. P², *aliquid* E corr. rec.; 766 *malis: malos* E F H Br Y² P² C² (*o* in eras. D); 973 *venias: veneas* H Br M P² C² D² Y²; 1022 *quid: qui* P C¹ Y D (O G lacking), *quid* A C² H Br M (E F lacking).

Other cases might be quoted to show the same source for the corrections of D² also.

² The *Armarium*, *Periocha*, and Prologue figure of the *Eunuchus* were not supplied in [ω] from the same source, because, as we have seen (p. 69), these had been lost in [X] before [X¹] was copied.

³ Cf. *And.* 712 *ducam: dicam* Y; *Haut.* 218 *locus: locis* C¹; *Eun.* 151 *illum* from *ullum* C; *Hec.* 200 *ullam: illam* F; *Hec.* 305 *unde: inde* F; *Hec.* 189 *it: ut*

15 B VIII read *est hoc*, possibly as the result of construction marks connecting *factum* and *est*. Moreover, in the list on pp. 75 ff. of P O against C Y, a fair proportion of [X³]'s readings seem to be shared by $\delta \mu$ or by single mss. of the mixed family. Now since μ does not share all of P O's peculiarities, but on the other hand often agrees with C Y, we can scarcely suppose [X¹] to have taken its rise from [X³] instead of from [X]. It is, therefore, possible that [X³] suffered some importation of variants from μ , such as the *dabo* and *scit* of P, the *dehinc* of P O $\delta \mu$ at *And.* 79, *tamen* of P¹ O F Z at *Haut.* 675, *adversus* of P O E F at *Phorm.* 78, etc.¹⁾ Such cases are so few that the doublets may have come down from [X], and many coincidences of P O with μ look more like independent errors, as *sequar* for *sequor* in *And.* 171, *oportune* for *opportune* in *And.* 345, *lucescit* for *luciscit* in *Haut.* 410, *natus* for *gnatus* in *Haut.* 528, *que* for *quae* in *Haut.* 604, *quod* for *quid* in *Haut.* 620, *fiet* for *fiat* in *Haut.* 715, *et quid* for *ecquid* in *Phorm.* 474, etc. At any rate, P is much purer than O, and even if we admit that [X³] was slightly contaminated, this must have been to a still greater extent true of [ω]. Besides the readings I have already quoted, the few other cases where P agrees with other mss. in errors not found in C O Y may all be attributed to accident:

And. 684 *erit* omit P¹ m.

871 *ecquid*: *et quid* P D E G and the later hand of Y.²⁾

Haut. 754 *sumptus*: *sumptos* P¹ A, — *tantos* just precedes.³⁾

Phorm. 384 *sobrinum*: *sobrium* P D¹ M, — nasalization of *n*, or the similarity of *i*, *n*, and *u*, caused this omission.

F; *Haut.* 534 *unde*: ^u*inde* F; *Haut.* 633 *inprudentem*: *inpridentem* G; *Haut.* 825 *fortunatus*: *fortunatis* C; *Haut.* 887 *fungit* from *fungit* F.

¹ Cf. *Phorm.* 518 *horunc*: *horum* O $\delta \mu$, *horum*// P (*c* erased). Probably [X³] had ^m*horunc*, and P substituted *m* for *n* alone instead of for *nc*.

² *c* and *t* are often confused, either for palaeographical reasons, or from similarity of sound. Cf. *Phorm.* 184 *tum*: *cum* Y; *Haut.* 746 *harunt*^c C; *Hec.* 288 *si citius*: *sic citius* P E, *sit citius* C¹ G F M H; *Haut.* 946 *retundam*: *recondam* O; and the many cases where *t* or *c* is followed by *i*.

³ Cf. also *Haut.* 125 *lectos*: *lectus* C; *Hec.* 459 *consobrinos*^u C; *Phorm.* 234 *monitor* from *monitur* C; *Haut.* 828 *loquitor*: *loquitur* A, *loquitor* from *loquitur* $\lambda^1 \Delta$; etc.

- 81 *nactus: natus* F¹ P¹ (*nactus* P²).¹⁾
- 123 *perduint: perdunt* P H Br M, *perdunt* G, — cf. *sobrium* above. The unfamiliarity of the scribes with the archaic form may have facilitated the corruption.
- 178 *nunc* omit A P E F, — almost haplography with *nunt* of the next word.²⁾
- 249 For *esse*, the gloss found in all the Calliopians, P E have *est*. Compare
- 603 *esse: est* P D M. If *esse* had the usual abbreviation, *ē* would be merely haplography. Cf. *Haut.* 673 *esse* γ μ: *est esse* E.
- 600 *attat: aiat* P D E H, — haplography.
- 665 *ancillula: ancilla* P D G, — almost haplography, especially if *a* had the "open" form.³⁾
- 862 *accurrit: occurrit* P E. *occipio* occurs in the same verse. But *o* and *a* are often confused.⁴⁾

It remains to discuss a few places where P offers the *correct* reading against the other γ MSS.:

Haut. 595 *egisti: egistin* all MSS. except A P. Unless this be a lucky error due to the assonance of *egi* preceding, *ne* was probably an early Calliopian gloss, still interlinear in [X], intended to show that *egisti* and not *egi* was to be taken with the interrogative *ecquid*.

¹ Cf. *And.* 967 *nactus: natus* G; *Phorm.* 168 *nactus: natus* F; *Ad.* 750 *facturum: faturum* P; *Haut.* 890 *expeto: expeto* from *expecto* E; *Haut.* 535 *invitum: invi//tum* D (*c* erased); *And.* 873 *mitte: mictē* D; *And.* 898 *amittere* Call.: *amictere* D; *Haut.* 480 *amittas: amictas* D.

² O has *nunc nunc nuntiet*. This may point to an interlinear *nunc* in [X³].

³ Cf. also *Haut.* 899 *paululum: paulum* Call.; *Haut.* 546 *adulescentuli: adulescenti* A λ. Also often *paululum* for *paulum*: *And.* 903 Call., *And.* 630 δ μ, *And.* 794 E G M, *Haut.* 498 G F α. *And.* 447 *aliquantum: aliquantulum* D E H Br; *Haut.* 627 *puellam: puellulam* E.

⁴ Cf. *Ad.* 451 *hac: hoc* P; *And.* 329 *profisciscor: profisciscar* E P²; *Eun.* 564 *dono: dona* C¹; *Hec.* 205 *accuser: a* from *o* C²; *Hec.* 86 *Corinthum: Carintham* D¹; *Haut.* 598 *alio: alia* D¹; *Haut.* 537 *eros: erās* D; *Phorm.* 27 *Phormio: formiā* G; etc.

1047 *accersi*: so P, *arcessi* C O Y H Br. *arcessi* was possibly a gloss in [X], adopted by [X²], but kept as a variant by [X³]. Or the correct form in P may be an accident.¹⁾

Phorm. 820 *ut*: *ut ut* all MSS. except A P F. It is highly probable that, as Kauer²⁾ maintains, *ut ut* is the correct reading, which P corrupted by haplography.

902 Before *ridiculum*, which A gives to Demipho, P has space for a nota. No such space is found in the other MSS., which give the whole line to Phormio. In [X] there must have been a space left for the *nota*, or else the latter was erased.

926 *hic maneat*: *hic omnis maneat* C O Y H Br, *hic maneat omnis* P. *omnis* in P is very small and crowded (not in eras., as Umpfenbach reports), and may possibly be by P², as Warren believed. However that may be, the word must have been interlin. in [X³], as also in [X].

And. 631 *est* omit C O Y H Br. P does not omit the word, but crowds it, in the form ÷, between *tempus* and *promissa*. I found no instances of the use of this abbreviation by P¹, and am inclined to think it a later addition, in spite of the similarity of the ink to that used by the first hand.

THE RESTORATION OF [X]

In comparatively few cases, therefore, do we get from P or O a hint not found in C Y λ of the readings of the γ archetype. But in one particular at least, P and O are more trustworthy sources for [X] than are C Y, and that is in the matter of verse distinction. Accuracy in this respect is, of course, to be attributed to the care of the copyist alone, and no amount of text-contamination from outside influence need have any effect upon it. P and O show a most remarkable unanimity

¹ Cf. *And.* 979 *accerse*: *arcesse* Δ ; *Eun.* 47 *accersor*: *arcessor* B D G M; *Eun.* 510 *accersier*: *arcessirier* D G; *Ad.* 354 *accerse*: *arcesse* B C F P² H Br; *Ad.* 890 *accersant*: *arcessant* D G.

² *Op. cit.*, p. 134, n. 1.

in this regard, not only transmitting the plays in accurate verse form, but also dividing at the same point the verses which are too long to be written on one line.¹ On the supposition that P and O are reproducing exactly the system followed by their archetype in dividing verses, Hoeing² based a conjecture that [X], which he took to be the immediate original of P and [ω], had 18 lines to the page, and that the lost lines, *And.* 804–853, were written on the two middle leaves of a quaternion. Although we have interposed [X³] between P [ω] and [X], this conjecture will still hold good, if we may believe that [X³] imitated accurately the verse-division of [X].³ A striking confirmation of Hoeing's theory is found in the fact that after *Phorm.* 499 P writes 518, a phenomenon hard to explain unless we suppose a whole page of 18 lines to have been skipped. It may well be that the scribe of P is not responsible for the displacement. He may have found l. 518 so written in his archetype, and copied it thus, with the signs restoring it to its proper position, whereas [ω], following the direction of these signs, actually made the transposition, with the result that in O the line is in its proper place.

There may be some connection between the *Andria* lacuna and the one at the beginning of the *Eun.* If [X] had 18 lines to the page, of which a space of 6 lines was devoted to each picture, we may arrange as follows the folia of [X] from *And.* 854 to *Eun.* Prol. 30:

1 r 854–864 (858–864 broken)

1 v 865–871 (865 broken) + Pict. at 5, 3 + 872–875.

2 r 876–893.

¹ See Hoeing, pp. 325–7. The identity of P and O is even more complete than Hoeing represents, for there were a few mistakes in Warren's report of "broken" lines in P. We find no lines broken in O that are not broken in P, or *vice versa*, but occasionally the two MSS. differ in the particular syllable at which a verse is broken. Of such disagreement the only instances in the *Andria* are: 178 P breaks after *fecit*, O after *neque*; 239 P after *communicatum*, O after the *o* of *oportuit*; 301 P after *nuptum*, O after *nup-*; 350 P after *pericli*, O after *est*; 397 P after *neglegentem*, O after *neglegen-*.

² *Op. cit.*, pp. 333–5.

³ At *And.* 254 C writes *mihi . . . Pamphile* on the margin. Since P and O break this line after *Pamphile*, C's error would go to show that [X²], which we have already found (p. 91) to have been written with verse-distinction, followed [X³] in reproducing also the broken lines of [X].

2^v 894-903 (900 broken) + Pict. at 5, 4 + 904 (broken).¹⁾

3^r 905-917 (906-908, 912, 917 broken).

3^v 918-929 (918-919, 921, 925-926, 928-929 broken).¹⁾

4^r 930-939 (930-933, 935-937, 939 broken).

4^v 940-949 (940-943, 945-949 broken).¹⁾

5^r 950-956 (all broken) + Pict. at 5, 5.²⁾

5^v 957-967 (957, 960, 962-963, 965-967 broken).

6^r 968-977 (969-971, 973-977 broken).

6^v 978-981 (978-979 broken) + Didascalia (11 lines) + 1 vacant line.

7^r *Eun.* Armarium.³⁾

7^v *Eun.* Per. and Fig. Prol.³⁾

8^r *Eun.* Prol. 1-15.

8^v *Eun.* Prol. 16-30.⁴⁾

Prefixing to these eight folia the two containing ll. 804-853, we have *one quinion*, from the beginning and end of which [X] lost two folia each. The opening folia of the *Eunuchus*, containing a large amount of free space, were cut out by someone in search of parchment, and this caused the loosening and consequent disappearance of the two folia at the beginning of the quinion. Fol. 7 was lost before [X¹] was copied,⁵⁾ and the rest before [X²] and [X³] took their rise.⁶⁾

¹ I have assumed here that the half line might be written below the last ruled line of the page.

² Four lines instead of six are allowed for the picture here, because, as it is at the bottom of the page, the lower margin could be utilized.

³ Cf. Bethe, *op. cit.*, p. 44.

⁴ Prologues were often accorded more space in the mss. than fell to the lot of the rest of the text. Cf. Hoeing, p. 334 and n. 2.

⁵ Cf. *supra*, p. 69.

⁶ Since this article was put into the hands of the printer, I have had brought to my notice Kauer's comprehensive review in Bursian's *Jahresbericht* 143, pp. 176-270, and I observe that in the course of his remarks on Hoeing's article, the writer discusses the loss of the γ mss. in the *Andria*. It is gratifying to find that the basis of Kauer's explanation is the same as the one I have adopted: the connection of the *Andria* loss with the one at the beginning of the *Eunuchus*. But he reaches quite a different conclusion in regard to the paging of [X]. For, while accepting Hoeing's distribution of *And.* 804-853, Kauer strangely assumes for [X] a page of 24 ll., instead of Hoeing's 18, apparently not observing that this 18 ll. includes the 6 ll. allowed for each picture. This page of 24 ll. Kauer then proceeds to alter into one of 25 ll., be-

If [X] was written 18 lines to the page, it is natural to suppose that the script was majuscule. There is little material on which to base a theory, but *digesse* for *dic esse* in P¹ O at *Phorm.* 712, and *pius* for *eius* in P O at 619 would seem to point to capitals.

To sum up, we have found that [X], the archetype of the γ family, was bound in quinions, and written possibly in capital script; that it was furnished with a small number of interlinear or marginal variants, but had no perceptible connection with the transmission of the mediaeval commentaries; that it had a complete set of miniatures, and occupied the position of intermediary between the non-illustrated and the illustrated tradition. From [X] were copied three lost MSS., [X¹], [X²], and [X³]. [X¹], corrected probably from some δ MS. of good standing, gave rise to the members of the mixed class, which show δ influence in such varying degree as to make it probable that the mixed tradition, besides the contamination of its archetype, was later subjected still further to the incorporation of δ readings. [X³] was the parent of P and [ω], from which O was copied. Possibly [X³], and certainly [ω], suffered an importation of variants from μ . [X²] was the original of C Y λ , which MSS., except in the matter of verse-distinction, afford the

cause P and O each have 25 ll. to the page, and on this basis he makes a rough estimate that one quaternion of [X] could contain *And.* 804–*Eun.* Prol. 30. It will be seen that my *quinion* is the result of a more careful calculation; nor does Kauer explain how *And.* 804–853 could fill four pages of 25 ll. each.

Furthermore, the confused version of the *Eun.* Prol. in D G leads Kauer to derive the δ archetype directly from [X]. D and G write ll. 30–45 before ll. 1–29, and therefore, Kauer argues, the scribe who copied the δ archetype, had for his prototype a MS. in which ll. 1–30 had been lost; but, noticing that l. 31 began in the middle of a sentence, he completed the sense by prefixing l. 30, which he found in some other MS. containing the *Eun.* Prol. intact, and then, from this same source, copied ll. 1–29 after l. 45. Such a procedure seems highly improbable. For, if the scribe was intelligent enough to observe that the sense of ll. 31 ff. was incomplete, how, we may ask, could he have been so stupid as not to copy the whole prologue in the proper order from his secondary source? But even if such an explanation can be accepted, surely we do not find in this possibility sufficient ground for deriving δ from the γ archetype, in the face of all the evidence which could be adduced against such a theory. If the corruption in δ has any connection at all with the loss in γ , it is far more likely that D and G were influenced by some early *mixed* MS., which fell heir, through [X¹], to some confusion resulting from the loss in [X]. But I agree with Hoeing in thinking that the displacement in δ is a phenomenon entirely independent of γ 's loss.

main source for the restoration of [X]. Such a restoration time will not allow me to complete in detail, but the principles which should govern the process are sufficiently clear. The errors of [X²] may be corrected from [X³], and *vice versa*, and in cases of doubt [X¹], particularly as represented by F H Br, is of value. The result cannot but enhance the dignity of [X], by shifting upon [X²] or [X³] the responsibility for many errors of which the mistakes of P, C, and O have heretofore appeared to accuse the archetype. The relative worth of δ and γ is another question, which cannot be settled without establishing the connection between D, G, Δ , V, and α . I believe that [X] will at least bear comparison with the δ archetype as affording a source for the reconstruction of the original Calliopian text.

APPENDIX I

The following is a list of all passages not elsewhere emphasized in this paper, in which Umpfenbach's report of the readings of P and C is seriously at fault.¹

And. 88 symbolam: "symbolum P." u ex a a man. post. um in ras. O¹? symbolam C Y H Br M, simbolum δ E Ld.

102 despondi: despondit O, despondi || P C Y.

103 obstat: "sic P, stat ex corr." obstat P¹, stat postea inductum.

154 qui: "quis C D G." qui C¹ G¹, quis C² G².

175 "et om. C." et C¹, alterum et add. C².

319 ad te advenio: ad te advenio C. puncta add. C², ut videtur.

360 ipso: "ipse C¹." etiam P¹ O Y.

353 prehendit: "apprehendit B D E P." prehendit P, apprehendit D E H Br m, adprehendit Δ .

423 uxore: "uxorem C." uxore C.

444 cauit: "caute P." cauit P.

451 opsonatum: "opsonatus ex opsonatum C." corr. C².

460 haud: "haud C." h et d add. C², hau P Y (O deest).

¹ I do not include here the corrections of P's readings in the *Andria* already noted by Hoening.

508 ere renuntio: "ere[†] nunti^o||| C." † add. C², o add. C¹.
ere ||| nuntio Y, ||| nuntio ere Δ.¹⁾

531 nolit: "nollit C P, corr. C² P¹." no || lit P Y.

622 dispiciam: "despiciam C¹." etiam P¹ O Y.

686 quis est: "quid est B C E." etiam G P O Y H Br.

721 obsecro est: "obsecro māli est P." mali et e in ras. a man. post.

723 malitia: "memoria D¹ E G et in ras. P." emoria in ras. a man. post.

857 severitas: "veritas C." ^{se}corr. C². veritas etiam P¹ O Δ (Y deest).

873 ac: "et P." et in ras. a man. post., ut videtur.

901 "hoc om. B D E G P." etiam C O Y H Br.

909 qua re: "quade re C." corr. C².

916 itane: "ita P, itane C." ne add. C².

939 SI. ne: "SI. ne C." ^{sa}sa add. C², etiam P².

941 odium: "odio P, o in ras." odium P¹, m eras. et o ex u a man. post., ut videtur.

945 CH. Ipsa east. CR. east: "CH. Ipsa est CR. Ea est B C P." CR. Ipsa est CH. Ea est B C P O G E H Br (Y deest), CH. Ipsa est CR. Ea est A Δ D¹ (in D notae Ψ et H sunt in ras. atram. nigro).

953 potest: "potes C¹." potest C.

Haut. 45 si: "sin F P." etiam C O Y M H Br.

94 ah quid: "ah P." h in P a man. post., sed hasta a P¹. fortasse ad P¹, quod habet etiam O. at C Y D¹ (ah man. post.). at vel ad μ (ut E). quod γ F M, quid D H Br E¹.

95 scies: "sciens C." etiam P¹, sciens O, scie || s Y.

154 qui fit ubi: "ibi fit ||| ubi P, ibi fit in ras. a corr." ibi ex qui a man. post., fit scripsit P¹.

170 ibo uisam: "ibo ut uisam F P." etiam C O Y H Br.

¹ I include this case here, although Miss Johnson's report is that *re* is probably deleted by C¹. If so, possibly Y¹ erased *re*. But in the case of deletions, the hand must often, of course, remain in doubt. I believe the change was made here, as in the case of Δ also, by correctors who used MSS. of the mixed group; cf. H: *ere nuntio*, although perhaps *renuntio* originally.

- 180 nostin: "nosti C F¹." *etiam* P O Y H Br.
 210 quod: "quid C E F." quod C E F.
 221 quod: "quid C D." quod C D.
 279 aut: "haut *ex* aut P." aut *ex* haut P C Y, haud O F H Br.
 288 ornantur: "ornatur E P." *etiam* C O Y F H (ornat Br).
 331 CLIT. Siquidem: "CLIT. *ex* CLIN *ut videtur* P." *corr. man. post.* CLIN. *etiam* C O Y H.
 485 petet: "quod petet *codd. omnes exc.* A F¹ P¹." quod *om. etiam* C¹ O Y.
 503 ita: "itan B D P." *etiam* C O Y H Br E² F².
 505 re in: "in re A D E G P." *etiam* C O Y F H Br.
 606 daturam: "daturam, a *in ras.* P." daturam P¹, daturum P².
 662 quid: "quod C E F² G." quid C.
 673 e faucibus: "ex faucibus P." *et cett. Call., ut ait Kauer. sed* e faucibus Δ D.
 740 egon: "sic B C E." *et* G (*addenda*, p. lxxxiv). *etiam cett. Call. exc. D¹. In P n in ras. a S¹ (Kauer). sed P¹ quoque egon scripsisse videtur.*
 813 ibin: "i B C E F P." is A C¹ λ O. i || P. i Y *in ras. duarum litterarum.*
 881 nisi idem: "nisi si idem B P." *etiam* C λ O Y F K Z L *et* E *interlin., fortasse a man. post.*
 892 iniecisse: "iniecis se P." iniecis se P.
 906 operuere: "operiere C¹." *etiam* P¹, — u *ex i a* P². opieriere Y, operiere O Z¹.
 1010 oh: "o C¹ D." *etiam* P O Y.
Phorm. Arg. 11 agnitam: "adgnitam A C D." *etiam* P O Y.
 2 a studio: "ab studio P B D E G." a studio P.
 138 feret: "fert B P." *etiam* C O Y H Br.
 166 depecisci: "depiscisci C¹." depicisci O Y. depecisci P, *altera e in ras., fortasse a man. post.*
 181 neque quo: "nec quo E P." *etiam* C F O Y H Br.
 209 abeo: "abeam *ex* abeo P¹." habeo P¹, h *eras., et ā ex o a man. post., ut videtur.*
 221 quod: "quod P." d *add.* P², quo C O Y H Br D.
 290 inmeritissimo: "inmeritissim[̄] G P." *corr.* P².
 296 necesse: "necesse || P." necessum P¹, *corr. man. post.* neces-

sum O Y. ^enecessum C, *corr. man. post.*

301 alio pacto, faenore: "alio pacto vel faenore B F P." *man. post. in P et C.*

321 "in om. C E¹." *etiam* P B O Y F H Br.

344 rationem in eas: "ratione si in eas P (si? *et in atram. diverso scripta*). si *in ras. atram. nigriore*, in eas *atram. pallido*. rationem P¹ *fortasse, cum* C Y.

356 "PH. *supra lineam* C P²" *corr.* C². PH. om Y, *interlin. a man. post.* O.

389 ego: "egon B E P, egone C D F G." egon B E P C O Y F H Br, egone D G.

552 "*Antiphonis orationem a dii bene incipiunt* B P¹." *etiam* C O Y H Br.

611 compluria: "conplura C." *etiam* P F O Y.

621 inter nos: "inter uos A B C D²." *etiam* P O Y F H Br M.

642 a primo: "a || primo P." *nulla est rasura. t add. man. post.*

661 pignori: "pignori F P, pigneri E." e *in P add.* P².

709 autem noui: "autem quid noui P." quid *add.* P².

712 "*Antiphoni tribuunt* abi — Phaedriae B D² P." *etiam* C O Y F.

719 abit: "abeat, ea *in ras.* P." eat *in ras. a man. post.*

726 convenit (congruit *Call.*): "congruetⁱ P." i *ex e fortasse effecit man. post.* congruet C O Y E F H Br.

759 et: "atque B C D E." *etiam* G P O Y F H Br.

762 nunc quid: numquid E F P." nunc quid P.

766 malis: "malos, o *in ras.* D P." a *man. post. in P.*

768 casam: "causam, us *in ras.* P." usam *in ras. a man. post.*

774 scio: "sciam C¹." *etiam* P¹ O Y.

809 una: "uno P." una P.

822 quas: "quam P." *ex* quas a P².

830 poteretur: "poteretur, prior e *in ras.* P, poteretur C." i *ex e a P², fortasse etiam* C². poteretur O Y.

848 institeris: "institeris P." u *add.* P².

871 AN. Quod: "PHO. Quod C." *etiam* P Y E H Br¹ (O *deest*).

888-9 ingratiis ei (ingratis eis *vel* iis *Call.*) : "ingratis sis P, *prior* s in sis in ras." iis (*vel* eis?) P. ingrati si is C, ingratis || iis Y (*s eras.*). O *deest.*

905 quidem ut : "semper *interlin.* P," *add.* P².

947 argentum : "argento ||, o in ras. D P." o ex u in P, *fortasse a man. post.*

973 venias : "veneas B C² P." veneas ex venias a P² Y².

980 cum : "ex in ras. P." *scripsit* P² in ras. *trium litterarum.*

1022 sed quid : "sed quid C." *alteram d add.* C² (sed qui P Y, O *deest.*).

1030 ogganniat : "obgonniat P?" obganniat P.

APPENDIX II

At the suggestion of Professor E. K. Rand, I examined a number of MSS. in Paris, Oxford, and London, in search of further evidence bearing upon his study of *Early Mediaeval Commentaries on Terence*, in *Class. Philol.* IV, 4 (1909), 359-389. In *P. A. P. A.* XL (1910), p. lxxii f., the writer adduces two Paris MSS., 7900 A, S. X, and 7184, S. XV, as giving additional support to his theory that *Vita* III^a and the argument beginning *Orto bello* formed the preface of the commentary furnished by the Monacensis. This hypothesis seems to be borne out also by Harleianus 2750, S. IX/X,¹ which contains this *vita* and argument written in the same hand as the text, and has a body of scholia clearly based on that of the Monacensis, with a few additions and omissions.² The same is true also of Paris. 7918, S. XV,³ although the divergences from the *Com. Mon.* are more numerous here.

¹ So Hauler, *Phormio*, p. 189, n. 3.

² The only ground of comparison is the *And. Arg.* and *Prol.* 1-12, for which Dziatzko has published all of M's scholia (*Jahrb.* 149 (1894), p. 470 f.).

³ After the end of *Vita* III^a (*captarent favorem*) this ms. has an explanation of the name *Andria*, not noted by Geppert (*Jahrb. Suppl.* 18 (1852), p. 45):

Fabula prima Andria vocatur eo quod quaedam femina nomine Crisis de Andro insula Graecorum Athenas venerat. Cum qua et Gliceriumque et Passibula vocabatur venit.

This passage occurs also in Paris. 7900 A, 7902, 7184 (these MSS. were reported on for Professor Rand by Dr. D. P. Lockwood), 7911, 7912, Harleianus 2656, Bod.

The other MSS. which contain the combination of *Vita* III^a and the argument *Orto bello*¹⁾ are Paris. 7911 and 7912, Harleianus 2656,²⁾ Bod. Laud 72 and 73,³⁾ Can. Lat. 94 and 97,⁴⁾ Auct. X, 1. 1. 20,⁵⁾ Douce 347.⁶⁾ Of these, Laud 73 and Paris. 7912 contain no scholia at all, Can. Lat. 97 has none on the *And. Arg.* or *Prol.*, and Harl. 2656 none before *Prol.* 17, and then only a few. The glosses of the others (Douce 347 is the only one in which they are at all numerous) show occasional points of agreement with *Com. Mon.*, but are in large measure different. Many of these divergent glosses, however, are found also in Paris. 7918 and Harl. 2750, and no doubt all these MSS. are to be taken together as having their source in a later development of the *Com. Mon.* There is certainly no trace in them of *Com. Br.* elements not found in M.

A very accurate and complete version of *Com. Mon.* is found in the "Ebnerianus"⁷⁾ (Bod. Auct. F. VI, 27, S. XI), which contains, however, not *Vita* III^a but *Vita* II,⁸⁾ without an *argumentum*. This might lend support to Dziatzko's theory (cf. Rand, pp. 377-8); but *Com. Mon.* might have been originally connected with *Vita* III^a and *Orto bello*, even though these elements became separated later and were recombined in various ways. For example, Bod. Can. Lat. 100 has the argument *Orto bello* in conjunction with Petrarch's *Vita*.

Laud 72, Auct. X, 1. 1. 20, Can. Lat. 94 and 97, Douce 347, and the Escorial ms. mentioned by Rand on p. 381. It corresponds to the note at the end of *Vita* III in *Com. Br.* (Bruns, p. 5; cf. *supra*, p. 57), and is contained in a condensed form in M's note on *And. Arg.* 2.

¹ *Vita* III^a, without any argument, is found in Brit. Mus. Ar. 247 (S. XV).

² The *vita* and argument, in the hand of the text, are found at the end of the *Phorm.* Dziatzko, *Comm. Wolff.* 224, dates this ms. S. XI/XII. The others in this list are all of the fifteenth century.

³ Fol. 1 r is nearly torn away, but the fragments of the *vita* and argument are clear.

⁴ Contains only *And.* and *Eun.*

⁵ Has the *alter exitus* of the *Andria*. I might note that this is found also in Brit. Mus. Barn. 265 (S. XV).

⁶ This ms. has *Vita* II on fol. 1 r before *Vita* III^a. The latter has lost the first sentence, and now begins *Revertente autem*.

⁷ Cf. Umpfenbach, p. 84.

⁸ I find no trace of Donatus excerpts in this ms. Cf. Rand, *P. A. P. A.* XL, p. lxxiii. Can. Lat. 99, whose scholia I cannot report on, has *Vita* II at the end of the *Phorm.*

It may be worth while to mention two MSS. which are interesting in connection with the *Com. Br.*¹: Paris. 16235 (Sorbonne 507), S. X,² (K), has on folia 1r, 1v, and 2r a series of selections from *Com. Br.*, beginning with the note on *Servavi. honesta oratio est* (*And.* 141), and ending with that on *Quid agat Pamphilus* (*And.* 957), upon which follows, after *FINIT* the explanation *Quo tempore . . . acta sit* (Bruns, p. 146). This series of running comments is an integral part of the MS., as is shown by the fact that the index of the plays immediately follows at the bottom of 2r. Similar introductions are written by the same hand for the other plays.³ At the top of 2v begins, in a different hand,⁴ *Vita III* with the title *INCIPIT COMMENTVM EVGRAFII IN COMMEDIAS TERENCII*. After the *Vita* the same hand continues: *Tres sunt characteres humilis mediocris et grandilocus. Sed humilis servatur in comediis. INCIPIT ANDRIAE PROLOGVS*. Upon this follows the beginning of Eugraphius' remarks on the *Andria* Prologue: *Cum omnes poetae virtutem oratoriam*, etc., to the bottom of 3r. On 3v begins the *Andria* Periocha. Selections from Eugraphius are found throughout the first four plays in the spaces originally left for miniatures.

Paris. 14755 (St. Victor 750), S. XII, (θ), begins on 1r with *Andria prima fabula . . . consequentia manifestant*, in the same hand as the text. This explanation is found in the Halensis⁵ just after *Vita III* and may be taken to represent in θ this part of the *Com. Br.* Next follows, as in Bruns: *Argumentum totius fabula istud est. Bello exorto*, etc. To the end of this Argument is attached the *Com. Br.* note on *And.* 28: *Quia Simo . . . domum deferri*.

Both θ and K, then, have the closest connection with *Com. Br.*, and we should expect to find further evidence of this fact in their interlinear

¹ Cf. Rand, p. 378, n. 3.

² Cf. *supra*, p. 68.

³ That of the *Eun.*, e. g., includes not only comments on the text, but also the exposition of the Didascalia and the other matter found in Bruns, pp. 153-156.

⁴ Cf. Dziatzko, *Fahrh.* 149 (1894), pp. 472 f. 2v and 3r may have been originally left vacant for the portrait of Terence and the Armarium with masks of the actors.

⁵ Bruns, p. 5. Cf. also *supra*, p. 57.

glosses.¹ The latter, however, show no points of agreement with the scholia of the Halensis,² being rather connected with the *Com. Mon.* or with the modifications of it found in Harl. 2750, Paris. 7918, Bod. Douce 347, etc. There are a few glosses peculiar to θ and K, or found in only one of them. Perhaps in both mss. the scholia have a different source from the text and its introductory matter. In K they are certainly later than the text. The scholiast hand of θ is similar to that which wrote the text, but much smaller.

On the whole, although I have found no striking confirmation of Professor Rand's hypotheses, the latter are not weakened by the investigation. Further study is useless without more complete information in regard to the Monacensis. For the benefit of any who may look into the question later, I might add that the following Bodleian mss. contain no *vita* or *argumentum*: Laud 74 and 76, E. D. Clarke 28, Auct. X, 1. 1. 19, Rawl. G. 112, Ashmol. 56. In Rawl. G. 136 the beginning of the *Andria* is lacking. Petrarch's *Vita* is found in Auct. X, 1. 5. 8 (as far as *operis huius indicant. ille*), Can. Lat. 103, and Harl. 2525.

¹ Other mss. containing *Vita* III and *Bello exorto* may be noted as follows: Bod. Laud 75 (*S.* XV) has no glosses, and Bod. Rawl. G. 135 (*c.* 1400) very few. Both these mss. contain the addition to the *Bello exorto* argument found in Bruns, p. 7: *Sensus vero . . . plaudite*. On Paris. 7900 see *supra*, pp. 57 ff. Paris. 7901 (*S.* XI) and 7904 (*S.* XII) I did not examine (cf. Geppert, *Serapeum*, 12 (1851), p. 372). Paris. 7913 has *Vita* III in the hand of the text, but no argument. Its glosses, of which there are none on the Periocha and but few elsewhere, have little resemblance to *Com. Mon.* or *Com. Br.* Perhaps they represent later accretions.

² The only exception is *suum* on *animum* (Prol. 1). Nor do K's glosses bear any trace of Eugraphius' influence.

ANTECEDENTS OF GREEK CORPUSCULAR THEORIES

BY WILLIAM ARTHUR HEIDEL

IN a measure hardly realized the character and direction of occidental thought have been predetermined by that of Greece. In studying the history of ideas it is customary to start with those of the Greeks, and many scholars have devoted themselves to the task of tracing their development; but it must be confessed that the results are somewhat disappointing. It may be desirable, therefore, before beginning our special inquiry, to consider the attitude of the historians of Greek thought, since by so doing we may at least arrive at an intelligent view of the method to be pursued in such studies.

The history of Greek thought begins to be a subject of investigation with Aristotle.¹ Of his method of study we can say little except that it was somewhat desultory. His point of view is, however, sufficiently clear. He found next to nothing in the pre-Socratics which had any bearing upon logic and ethics. In metaphysics, and in the special physical and biological sciences, there was a good deal; and this he had more or less roughly tabulated ready to his hand to be used on occasion. It is plainly to be seen that he had wrought out the principles of his philosophy before he wrote any of his extant systematic works. When, therefore, as he proposes some fundamental question, he reviews the opinions of his predecessors, he is guided by a highly abstract and fundamentally metaphysical conception. The occasions on which he is able to discover an exact parallel to his own views are consequently rare; and, what is more important, he not infrequently, though of course without intention, misrepresents the opinions of others by relating them to categories of his own invention. In fields where he was less at home, as for example in those of medicine and mathematics, he delegated the task of gathering the needful data and sketch-

¹ Cf. the interesting sketch of the development of the 'constructive' view of the philosophy of history given by Wundt, *Völkerpsychologie*, Bd. II, Th. I, p. 532 f.

ing the history of ideas to certain members of his school. When Theophrastus wrote his *Φυσικῶν Δόξαι* he did so under the spell of his master's example: the same bias for the abstract and metaphysical points of view is clearly to be seen. Nor was this to be wondered at. In the hey-day of metaphysics, especially of a system of metaphysics like that of Aristotle, so completely articulated that it could for ages enthrall the mind of man, one cannot expect in an enthusiastic adherent of the school an objective judgment; least of all could one hope to find that his unconscious prepossessions had not influenced the selection or rejection of this or the other factor or phase of the thought he was tracing. Every act of selection is determined by interest, and we have seen that the interest of Theophrastus was predominantly metaphysical. We must advert to one other point at which the honest Theophrastus fails us; standing at the beginning of the historical review of Greek thought, he could not see, what to the modern student is strikingly obvious, that there is much more than a golden thread of unity running through the whole pattern. In making his choice of this or that to report, he was guided by the principle of selecting the distinctive doctrines, thus unwittingly creating a false impression when the originals, from which he made the abstract, ceased to be consulted and finally were lost. During the later years of antiquity his abstract, or most commonly extracts from his abstract, were almost the only source of knowledge regarding the history of Greek philosophy to be consulted.

In modern times the interest in the history of Greek philosophy dates from Hegel, who in his turn was again dominated by an enthusiasm for 'logical' or metaphysical thought. Holding that the historical development of ideas conformed of necessity to the steps in the dialectical evolution of reason, he drew attention to a sequence of most abstractly formulated conceptions, overlooking or ignoring the concrete notions or 'Anschauungen' which conditioned or created the logical principles. Although during the last decades historians of Greek thought have in a large measure emancipated themselves from the direct influence of Hegel, the metaphysical bias is still generally to be detected. Those who, like Tannery, Burnet, and Gomperz, have contributed most to the elucidation of the history of ideas, are either anti-metaphysical or come to the study of the subject with a larger interest born of occupation with the general thought of the period.

The day is happily past, or is rapidly passing, when one could profess to write a history of Greek philosophy without taking into account every department of Greek thought and activity. Philosophy was not in ancient days, certainly not in the pre-Socratic period, a study of the closet. Men who were endeavoring to relate the common experience of the race to general principles naturally came into touch with others of like interests, although they might be engaged on less general lines of work. Thus philosophers were from the first associated with mathematicians and physicians, and one and all with men who extended their horizon by travel. Indeed, it is something of an anachronism to make even these distinctions in regard to the earlier 'philosophers': they were quite apt to unite in their persons several or all of these characters. Just as we cannot consider the fifth century philosopher without having regard to Hecataeus and Herodotus and even Thucydides, or, on another side, to the mathematicians and 'Hippocrates': so it is a serious error to take the view that philosophy is to be considered solely in connection with known names, or even that we can determine exactly from whom a particular notion was derived. Although the fifth century B.C. was productive of much literature,¹ it was not really an age of books. The main channels of communication were not yet those of literature; and we can never know or even surmise, except in a few clearly marked instances, whence the inspiration came which prompted this or that development. But a close study of many related problems, if conducted in a broad and enlightened way, must lead in the end to a knowledge of those fundamental notions of concrete things and processes upon which, in the last resort, all philosophy rests. When that stage is reached, it will be time to attempt again a history of Greek philosophy.

Hermann Usener² well said that a people's real development is generally completed when it emerges into the light of history. In the darkness before the dawn it forms the views of life and the conceptions of the concrete facts and phenomena of nature which are destined to

¹ Recent additions to our knowledge of Greek medicine suggest the existence of much literature which is now irretrievably lost. We might have guessed this even from 'Hippocrates.' This is one of the factors which render the problem of the Hippocratean Corpus hopeless of solution.

² *Vorträge und Aufsätze*, p. 110 f.

characterize it during its later career.¹ If it were otherwise the homogeneity of point of view and the consequent individuality of a people, which mark it off from other peoples, would be unintelligible. This is well illustrated by Homer, in whom the Greeks themselves were wont to seek the beginnings of all things.² Such common points of view would naturally not be the subject of discussion. Just because they constituted the presuppositions of all reflection they would be ignored, although they foreshadowed the inferences to be drawn from them. Only when a number of such presuppositions had worked themselves out to their several conclusions, either mutually contradictory or else not obviously related, would critical reflection arise to set the world of thought in order.³ This fact renders the history of ideas difficult. On the one hand, there is a strong temptation to jump to a conclusion, assuming the existence of a conception where it is not, and possibly cannot be; on the other hand, it is possible entirely to overlook a notion which is undoubtedly present. In order to guard against these errors one must take several precautions. One must school oneself to distinguish between primitive ideas, which are never abstract, and derivative ideas, which are progressively abstract. With regard to the latter, the only true course to pursue is to disallow their presence unless the evidence for it is clear and convincing, whereas a truly primitive notion may be safely inferred wherever it serves to elucidate a complex of ideas. In regard to derivative ideas we are often misled by the fact

¹ This holds true also of modern European civilization. Such community of thought in fundamentals as exists between the peoples of Western Europe is due in no small measure to the 'antenatal' assimilation of the civilization of Greece mediated by Rome to that of the northern tribes during the Dark Ages, powerfully reinforced though it was by the influence of the Renaissance.

² I need not say that the practice was often ill-founded. Nevertheless it is true that the organic conceptions on which rested the Greek ethical, religious, and political development in historical times are almost without exception to be found in Homer. Every scholar will have noted this fact in his own peculiar sphere of interest. A few illustrations will be given below.

³ A people dominated by a single idea would perhaps be capable of development, but certainly not of producing a philosophy. It is in some such way that we must explain the history of Hebrew thought, although the Hebrews were, of course, not a people of one idea. Nevertheless, as compared with the Greeks, there is a marked difference in the number of 'motifs' which they developed.

that *we* cannot conceive a given relation without assuming the idea in question. Here a broad study of the problem will often prove that our inability otherwise to conceive of the matter is due to other presuppositions, whereas a different conception was undoubtedly entertained by men who held well considered opinions.¹

The history of Greek corpuscular theories presents a problem of peculiar interest. When one speaks of 'corpuscular theories' one thinks at once of Atomism, although the 'atomic' theory itself was only one of a considerable number of hypotheses propounded in antiquity. When the time comes for a history² of these hypotheses it will be seen that they are in fact closely related, growing in the main out of a complex of primitive conceptions so interwoven with the thought of the Greeks in many spheres that in one form or another they have dominated the philosophy of nature down to our own day. It will be seen also that the particular hypothesis which is properly called Atomism owes its specific character entirely to metaphysical and epistemological considerations, to which are unquestionably due the prominence and preference given to it in the history of philosophy, despite the fact that nearly every distinction upon which it rests has been discarded by modern thought. But we must now turn from these matters to the consideration of the antecedents of the various corpuscular theories.³

Of these the Atomic is best known to us, particularly in the form which it received at the hands of Epicurus. And considering the sad wreck of what of old constituted the superb literature of Greek phi-

¹ Numerous illustrations of this could be cited. I will mention only one. In my *Qualitative Change in Pre-Socratic Philosophy*, *Archiv f. Gesch. der Philos.* XIX (1906), p. 333 f., I called attention to the case of ἀλλοίωσις; other evidence on the same subject will be presented below in connection with the conception of πέψις.

² Mabillean's *Histoire de la philosophie atomistique*, Paris, 1895, possesses little value; the *Geschichte der Atomistik vom Mittelalter bis Newton* by Kurd Lasswitz, Hamburg and Leipsic, 1890, deals but briefly with Greek Atomism, but is much better. It is not necessary to speak of the treatment of the subject in the comprehensive histories of Greek philosophy.

³ The limits of this paper do not admit of a full discussion of the subject. Here only a few points can be considered in a provisional way. Certain matters were treated of in my paper, *Τα ἀναρροί θγκοί of Heraclides and Asclepiades*, *Trans. Amer. Philol. Ass'n*, XL (1910), p. 5 f. I hope later to give a connected account of the whole subject.

losophy, we are peculiarly fortunate in having preserved to us the poem of the Roman Lucretius. In his *De Rerum Natura* he unfolds to us the corpuscular view of the world set forth in order with ample argument and with constant illustrations and applications. His aim, to be sure, is the establishment of the *atomic* hypothesis; but it is obvious even to the casual reader that but a small proportion of his poem deals with the subject matter in a way to exclude the application of his arguments to the uses of almost any corpuscular theory. His manner, moreover, is altogether that of a poet who is aware that he belongs to a noble line which includes Empedocles, Parmenides, and Xenophanes. He appropriates figures from Heraclitus and frankly admires Democritus. Pursuant to the example of his master, Epicurus, he culls illustrations and arguments wherever he can find them. In fact, his poem impresses one as holding much the same position relative to Greek philosophy as does the epic of Vergil to the achievements of his predecessors: whatever there was in them worthy to be enshrined in his verse he appropriated, provided it could be turned to account. The impression of the essential solidarity of the Greek corpuscular philosophy grows upon one as one studies the arguments in detail. We shall therefore avail ourselves of the scheme of Lucretius as a frame for our inquiry, trusting that the event will justify the procedure.

Lucretius begins his exposition (1, 150) with the principle: *nullam rem e nilo gigni diuinitus umquam*. Essentially this is the cornerstone of Greek philosophy, assumed, as Aristotle says, by all Greek physiologists,¹ but apparently first distinctly enunciated by Parmenides.² The proof of this principle Lucretius finds in the fact that everything springs from determinate antecedents, or as he calls them, *semina certa*.³

¹ It is not necessary to quote the passages: *Phys.* 187^a 27, 34; 191^b 13; *Met.* 984^a 29 f.; 1062^b 24; *de Gen. et corr.* 317^b 20. See my *Περὶ Φύσεως*, *Proceedings Amer. Acad. of Arts and Sciences*, XLV, p. 91, n. 49.

² See Zeller, *Philosophie der Griechen*, I^a, p. 411, n. 2; but there is clearly an error in his reference.

³ 1, 159-214; 577-598; 881 ff. Sometimes, but rarely, as 1, 521, the *corpora certa* are definitely conceived of as atomic. In 2, 700 f., they account for the fixed species, that is, for offspring remaining true to type and not proving to be monstrosities; likewise, for the fact that the increments in organic growth maintain the organism in its original shape. Here enters the fact of nutrition, closely allied to γένεσις; cf. *cibus* and *certa genetrix*. For *cibus* see 1, 861, and below *passim*.

In a word, as origination (γένεσις) of all sorts is typified by the generation of organic beings, so the fixed species of plants and animals furnish the model for all processes and laws of nature. Obviously this is a primitive conception, though it had become generalized as a logical or metaphysical principle; and we are therefore prepared to find that the same observation was connected with the principle not only by Epicurus, but also by Anaxagoras and Parmenides.¹ Who will doubt that this and kindred observations of the 'natural man' led to the formulation of the postulate?

The converse of this principle Lucretius states 1, 237: *haud igitur possunt ad nilum quaeque reuerti*.² Again the burden of the proof is borne by considerations germane to the *semina certa*. The illustrations are one and all drawn from primitive observations which are known to have engaged the thought of the earliest philosophers.³

The poet next proceeds to show that matter exists in the form of minute particles (1, 265-328). His object is to prove that the slow processes of nature operate by means of corpuscles which, though

¹ Epicurus, apud Diog. L. 10, 38: οὐδὲν γίνεται ἐκ τοῦ μὴ ὄντος. πᾶν γὰρ ἐκ παντὸς ἐγίγνετ' ἂν σπερμάτων γε οὐθὲν προσδεόμενον. For Anaxagoras see the detailed statement of Simplicius, *Phys.* 460, 4-461, 27. Parmenides, fr. 8, 12: οὐδέ ποτ' ἐκ μὴ ὄντος ἐφήσει πῖστος ἰσχυρὸς | γίγνεσθαι τι παρ' αὐτό. Nothing but the non-existent can spring from the non-existent! Cf. also Arist. *Phys.* 196^a 31 ff.

² See Lucr. 1, 215-264; 540-550.

³ The essence of the argument is in 225-231:

praeterea quaecumque uertustate amouet aetas, | si penitus perimit consumens materiem omnem, | unde animale genus *generatim* in lumina uitae | reducit Venus, aut reductum daedala tellus | unde alit atque auget *generatim* pabula praebens? | Vnde mare ingenui fontes externaque longe | flumina suppeditant? unde aether sidera pascit? and again in 262 ff.: *haud igitur penitus pereunt quaecumque uidentur, | quando alid ex alio reficit natura nec ullam | rem gigni patitur nisi morte adiuta aliena*. In these and the intervening verses the poet alludes (*a*) to the conditions necessary to the maintenance of continuous becoming, which Aristotle says Anaximander had sought to provide for by postulating the Infinite as his ἀρχή; (*b*) to the *semina certa*, as already stated, which according to Parmenides would admit only of the birth of the non-existent, if the non-existent were its antecedent; (*c*) to the problem of the μέτρα of the sea, which was settled by Heraclitus, fr. 31; and (*d*) to the process of ἀναθυμλασις, which provides the nutriment for the stars according to all early philosophers and furnishes likewise the model for the κύκλος γενέσεως to all thinkers from Thales onwards.

clearly material, are small beyond human ken.¹ So far as there is any polemic, expressed or implied, it is directed against the Eleatic exclusion of a void, which results in a block universe precluding the possibility of motion, and against the assumption of motion in a plenum.² To the mind of the atomist the twin postulates of atomic corpuscles and of empty space are strictly correlative, each requiring the other by logical necessity. With this argument we are not now concerned. In connection with it, however, Lucretius states that almost all the early philosophers of Greece regarded matter as porous, although like the illustrious Empedocles they made in his opinion shipwreck of their faith by failing to postulate the existence of a void.³ This statement has received far less attention than it deserves; for it is unquestionably true, as our study will show.

It is interesting to note the facts to which Lucretius appeals in seeking to prove the corpuscular constitution of matter. We may here disregard the peculiar nature of the argument, due to the difficulty of defending the assumption that atoms and void together constitute ultimate reality, because the Epicurean regarded the senses, the testimony of which was rather generally impugned by pre-Socratics, as the final court of appeal. The poet, then, begins with a reference to the winds,⁴ which though unseen deal destruction as real as that wrought

¹ The *corpora caeca* are λόγω θέωρητά, for (I, 321) *inuida praeclusit speciem natura uidendi*. Cf. Plato, *Tim.* 45 E; for Anaxagoras see Arist. *Phys.* 187^a 37 ff., Sext. Empir. 7, 90; and note Hipp. II. ἀρχαίης λητρικῆς, 14 (I, 602 L.): ταῦτα μὲν μεμιγμένα καὶ κεκρημένα ἀλλήλοισι οὔτε φανερά ἐστιν κτλ.

² Probably Lucretius (I, 370 f.) had Aristotle and Plato chiefly in mind; see Arist. *Phys.* 214^a 28 f., Plato, *Tim.* 79 B f. Plato's view is stated in connection with the process of respiration, in which he follows the medical tradition likewise appearing in Empedocles. For Empedocles see Zeller, *Phil. der Griechen*, Ib, p. 768, n. 1; for Anaxagoras, *ibid.*, Ib, p. 989, n. 3.

³ Lucr., I, 734 f. In *supra quos diximus* he refers to 705 f., where he has mentioned (1) the 'monists' who posited as their ἀρχή, fire (Heraclitus and Hippasus), or air (Anaximenes, Diogenes of Apollonia, and in large part the medical tradition), or water (Thales and Hippo); (2) those who posited ἀρχαί in pairs, as air and fire (probably alluding to certain medici), or earth and water (Xenophanes); (3) those who posited four, fire, earth, soul (air), and rain (water), of whom Empedocles was chief (doubtless alluding to the medici of the Sicilian school): all these *res molles* (yielding) *rarasque* (porous) *relinquunt* (I, 743). The porosity of matter is a necessary correlate to its corpuscular constitution.

⁴ I, 271 f. With this passage compare Hipp. II. φυσέων, 3 (6, 94 L.).

by water. He next cites the instances of the invisible effluvia of odoriferous things¹ striking the sense; of heat, cold,² and sound,³ all of which operate by invisible bodies; of the imperceptible evaporation⁴ by which garments at the seaside become moist or dry; of the gradual wearing away of a ring⁵ worn on the finger, of stones by the constant dropping of water,⁶ of a ploughshare or pavement in use, and of statues in public places exposed to the touch of passing crowds;⁷ of the infinitesimal increments and decrements of organic growth or decay⁸ which become visible only by summation; of the secular process of disintegration in cliffs overhanging the sea.⁹ This is a formidable list, but it receives additions from other passages, as 6, 921 f., where the poet summarizes the arguments for the existence of effluvia streaming unceasingly from all bodies.¹⁰ Here, besides instances already cited,¹¹ he

¹ 1, 298; cf. 4, 673-686 and 6, 924. For the sense of smell, cf. Epicurus, apud Diog. L. 10, 53. The explanation of the hounds following the scent (4, 680 f.) is found in Empedocles, fr. 102; cf. Beare, *Gr. Theories of Elementary Cognition*, p. 135, n. 2. For the ἀποφορὰ on which the theory rests, see Diels, Anonym. Londin. 33, 15 f. In Anaxagoras, Democritus, and Diogenes of Apollonia, smell depends on such ἀποφορὰ. In Heraclitus it is the result of ἀναθυμῆσις, his typical form of ἀποφορὰ (fr. 7 and 98). Hipp. II. σαρκῶν, 16 (8, 604 L.), like all the older philosophers, connects smelling with respiration.

² 1, 300; cf. 1, 490, 534, 6, 925.

³ 1, 301; cf. 1, 354 f., 4, 524 f., and Epicurus, apud Diog. L. 10, 53.

⁴ 1, 305; cf. 6, 470 f., 616 f.; Diels, Anonym. Londin. 30, 40 f.

⁵ 1, 312; cf. Melissus, fr. 8: ἀλλ' ὃ τε σίδηρος σκληρὸς ἔων (sc. δοκεῖ ἡμῖν) τῷ δακτύλῳ κατατρίβεσθαι ὁμοῦ ῥέων (ὁμωρέων? Bergk), καὶ χρυσὸς καὶ λίθος καὶ ἄλλο ὃ τι ἰσχυρὸν δοκεῖ εἶναι πᾶν, ἐξ ὕδατος τε γῆ καὶ λίθος γίνεσθαι· ὥστε συμβαίνει μήτε ὄραν μήτε τὰ θντα γινώσκειν. The meaning is clear and is much the same whether we accept the MS. reading or Bergk's conjecture, which is approved by Burnet, *Early Gr. Philosophy*², p. 373, n. 1. But ὁμοῦ ῥέων more clearly marks the connection with the πάντα ῥεῖ of Heraclitus.

⁶ 1, 313; doubtless, as with us, proverbial. See Otto, *Sprichwörter*, p. 156.

⁷ 1, 313-318. Something of this sort is implied by Melissus, above n. 5. See Otto, *ibid.*, p. 27.

⁸ 1, 322-325; this is the problem of αὔξις and φθίσις to be considered hereafter in connection with nutrition (τροφή).

⁹ 1, 326; cf. 6, 925 f.

¹⁰ It is to be noted that the examples illustrate the view that sense-perception is caused by effluvia, each of the 'five senses' receiving attention in turn. More of this below.

¹¹ That is, odors (6, 924), heat and cold, regarded as pertaining to the sense of touch (925), and sounds (927).

refers to the 'idols' upon which sight depends,¹ and the experience of having a salt taste in the mouth by the seaside or a bitter taste as one watches the preparation of wormwood.² We must not overlook the extensive use which Lucretius makes of the effluvia streaming from all things. It is true that he regards them as atoms, but the conceptions were in no way dependent on this specific interpretation of the phenomena. It would be a long story to enumerate the passages, and we shall content ourselves with a few of the most important. Thus the elaborate system of 'idols' is only a single specialized form of the general doctrine. Evaporation plays a prominent part in the cosmology,³ and in the discussion of meteorological phenomena⁴ it is supremely important. It explains the fact that the sea does not overstep its bounds;⁵ and, besides having intimate relations to the problem of the soul, is invoked to elucidate the striking phenomena of the Plutonia and Lake Avernus,⁶ and of pestilences.⁷ The mystery of the magnet also is explained by its effluvia.⁸

After justifying the assumption of infinitesimal corpuscles, Lucretius proceeds⁹ to prove the existence of a void. Here again, as we should expect from the intimate connection of the two conceptions, the facts adduced are in great part the same¹⁰ which we have already met in the arguments for the *corpora caeca*: only we have to note that, in conformity with the new point of view, a new aspect is emphasized. Among

¹ 6, 921-923; see Bk. 4, *passim*, especially 42-109. Special regard is there had to color (74 f.), odor, smoke, and heat (90), and the reflected images in mirrors (98).

² 6, 929.

³ 5, 449-494. It is perhaps worth noting that Bästlein, *Quid Lucretius debuerit Empedocli Agrigentino*, p. 15 f. considers the whole passage an imitation of Empedocles.

⁴ 6, 451-534; 451-507 deal with *ἀναθυμίασις*, 507-526 with precipitation.

⁵ 6, 608-638; cf. 5, 264 f.

⁶ 6, 738-839.

⁷ 6, 1090-1286.

⁸ 6, 909-1089. The magnet is said by Aristotle to have interested Thales, who is reported to have attributed a soul to it (Arist. *de Anima*, 405^a 19). Whether this implies that Thales accepted the view of the soul as *ἀναθυμίασις* or not, we do not know. Aristotle puts it into relation with the power of the soul to move the body; but we do not know his reasons for doing so.

⁹ 1, 329-417; cf. 6, 936 f.

¹⁰ Thus, sounds (1, 354, 489; 6, 951), heat and cold (1, 355, 494, 534; 6, 948), odors (6, 952).

the phenomena not previously mentioned we may cite the following: waters percolating through rocks and dripping in caves,¹ the distribution of foods throughout the body,² perspiration,³ and probably the 'cosmic breathing.'⁴

In a study of Greek corpuscular theories which purported to be exhaustive it would be necessary to make the list of phenomena adduced in support of them complete and to examine each in turn, tracing the history of the conceptions which the Greeks formed of them. A philosophical commentary on Lucretius written by a scholar conversant with Greek philosophical thought and alive to the significance of the arguments marshalled by the poet, is something greatly to be desired, but not soon to be expected. The scattered notes given above merely indicate a few points to be considered. Yet, rightly pondered, they must impress the student with the significance of two facts: first, that the list of important *loci*, or philosophical problems, which were destined to challenge every philosopher, was practically complete long before the formulation of the *atomic* theory; and secondly, that the conceptions with which the several philosophers operated in essaying to solve these problems were actually few in number and derived in the last resort from very simple notions connected with natural phenomena conceived after the manner of primitive man. The significance of some of these conceptions for Greek thought appears to have been generally overlooked. In the remainder of this study a number of these shall be considered somewhat more at length.

¹ 1, 348; cf. 6, 942.

² 1, 350; cf. 6, 946.

³ 6, 944. In connection with sweat Lucretius mentions also the nutrition of beard and hairs over the surface of the body as evidence of its porous nature, apparently not distinguishing between the hair-follicles and the sweat-glands. There is nothing strange in this, as Merrill thinks; the respiratory and vascular ducts or 'pores' are so intimately connected that they constitute one system, and the hairs grow out of the 'pores' of the skin.

⁴ 6, 954: *denique qua circum caeli lorica coeret*. The passage is manifestly fragmentary; but there is no way to reconstruct the text, since the following lines likewise are either incomplete or in confusion. That Lucretius employed the conception of cosmic *ἀναπνοή* or *τροφή* in other connections is certain: thus 6, 483-494, he refers to the entrance of extra-cosmic atoms within the walls of the world, where they unite with the evaporation from the earth and form clouds. We shall presently refer to 1, 988 f., 1037 f., and 2, 1105 f. See p. 140, n. 1.

Probably no other natural phenomenon played so important a rôle in Greek philosophy as evaporation. The generally dry air and strong sunlight of Greece cause evaporation in a measure which must inevitably arrest the attention of an observing people. It may, however, be truthfully said that the significance of the conception for Greek thought has received scant recognition.¹ The failure duly to appreciate its importance can hardly be explained except on the assumption that scholars have tacitly attributed its undoubted prominence in later literature to the influence of the Stoics.

It is true that the Stoics found ἀναθυμίασις everywhere in their interpretation of Homer and Hesiod; but the inevitable reaction against their 'allegorical' interpretation should not be allowed to blind us to the obvious facts of history. They did not invent either the term² or the method of interpretation.³ The suggestion of Aristotle touching the true meaning of Oceanus in Homer is well known;⁴ and we are not reduced to the late Allegorist Heraclitus⁵ for testimony that Thales was prompted by considerations connected with evaporation and precipitation to propose the theory that all things are derived from water, since Theophrastus, evidently expanding a hint of Aristotle, briefly advanced

¹ I spoke briefly of this in my paper, *Qualitative Change in Pre-Socratic Philosophy*, *Archiv f. Gesch. der Philos.* XIX (1906), p. 339 f. Burnet, *Early Gr. Philosophy*, ed. 2 (1908), subsequently more fully appreciated its significance, especially in dealing with Heraclitus. Otto Gilbert, *Die Meteorologischen Theorien des gr. Altertums* (Leipsic, 1907), p. 439 ff. has done the subject fuller justice, for which he may have been prepared in part by the studies preparatory to his *Gr. Götterlehre*, 1898, as well as by the detailed study of meteorological phenomena as interpreted by the Greeks. In the field of Greek religion the subject has to my knowledge received no special attention, although it is mentioned incidentally by Gruppe in many connections.

² Diels, *Heraclitus von Ephesos*², p. xvi, regards the word ἀναθυμίασις as a coinage of Heraclitus.

³ It is evident that ἀναθυμίασις is implied in the interpretation of the θεομαχία by Theagenes (6th century), Diels, *Vorsokr.*², p. 511, 16 f.

⁴ Arist. *Meteor.* 347^a 6 f. Cf. Gilbert, *Meteorol. Theorien*, p. 393 f. esp. *ibid.*, n. 2.

⁵ Ritter-Preller, 12^a: ἡ γὰρ ὑγρὰ φύσις εὐμαρῶς εἰς ἕκαστα μεταπλαττομένη πρὸς τὸ ποικίλον εἴθε μορφοῦσθαι· τὸ τε γὰρ ἐξατμίζομενον αὐτῆς ἀερούται, καὶ τὸ λεπτότατον ἀπὸ ἀέρος αἰθὴρ ἀνάπτεται, συνιζάνον τε τὸ ὕδωρ καὶ μεταβαλλόμενον εἰς ἴλυν ἀπογαίουται· διὸ δὴ τῆς τετραδὸς τῶν στοιχείων ὥσπερ αἰτιώτατον θαλῆς ἀπεφάνητο τὸ ὕδωρ. See also Burnet, *Early Gr. Philosophy*², pp. 48-50.

the same view.¹ But it is neither necessary nor profitable to repeat here what has for our present purposes been sufficiently said by others² in regard to the use of evaporation as a cosmic process among the early philosophers.

Before considering the significance of evaporation (*ἀναθυμίασις*) to Greek thought outside the sphere of philosophy proper, it is well to note the scope of the conception. Whatever its etymology and original use,³ it came in time to comprehend all forms of exhalations and emanations.⁴ We may therefore group together under this head phenomena which may not have been called by this particular name in the early period, since our object is merely to indicate the importance of the class of processes in question, which embraces every variety of effluvia (*ἀπορροαί* and *ἀποφοραί*).⁵

¹ See my *Qualitative Change*, p. 340, n. 17, and add Hippolytus cited in Ritter-Preller, 12^a.

² See, e. g., Gilbert, *op. cit.*, p. 445, n. 1, for Anaximander, Anaximenes, and Parmenides; *ibid.*, p. 446, n. 1, for Xenophanes; p. 448 f., for Heraclitus; p. 458, n. 2, for Empedocles and Anaxagoras; p. 459, for Plato. Gilbert recognizes the 'mechanical' character of Plato's explanation of meteorological phenomena, because there is indeed no possibility of interpreting it otherwise; but he believes that the so-called 'monists' regarded the cosmic process as 'dynamic', although the identical conceptions recur in each case. This fact illustrates the pressing need of a study of individual problems and the reconstruction of the history of Greek thought on the basis of such investigations. Thus a critical review of the cosmic *πόλεμος* and of *ἀντιπερίστας* and *ἀντιμετάστας*, together with *ἐπικράτεια* and other conceptions derived from the analogy of war, and a similar consideration of the One and the Many in early Greek thought, would contribute more to a clear understanding of questions than the application of metaphysical notions derived from Aristotle or Hegel.

³ Gilbert, *op. cit.*, p. 450, n. 1.

⁴ Cf. *Schol. in Aeschyl. Septem*, 494 (Dindorf, Oxford, 1851, III, p. 355, 7): *λιγνύν*] *ἀναθυμίασιν* Ο. *καπνόν. καπνός ἀπὸ ξύλων, ἀτμός ἀπὸ ὕδατος, αἰθάλη ἀπὸ λίθου, βδέλος ἀπὸ λύχνου, λιγνός ἀπὸ κηρίων καὶ ἐλαίων, κνίσσα ἀπὸ τῶν κρεῶν.* Β.

⁵ Various examples have already been given above. In order to appreciate this class of phenomena one must call to mind that the early philosophers found their *ἀρχαί* in water, 'air', or fire, or in doubtful intermediaries. Where, as in Xenophanes, earth is called an *ἀρχή*, the same fundamental fact of exhalations from the earth returning in precipitation was evidently uppermost in the thinker's mind. Of water and its evaporation we have already spoken. 'Air' in the early time was just vapor or *ἀναθυμίασις*: hence Heraclitus could dispense with it as a substantive form of matter possessing its proper *μέτρα*, and regard it as the mediating factor *par excellence* (cf. fr. 31, δι' ἀέρος τρέπεται). In fact *ἀναθυμίασις* in its various stages is the

The apperceptions of primitive man, which gave rise to the scientific concepts of a later age, were not essentially influenced by later developments. Intellectual progress, as it is called, consists generally in combining and rationalizing these early apperceptions; but while the thinker may for a time ignore them, just because they are the presuppositions of his thought, they will ultimately force themselves upon his attention. When he returns to the facts from which his apperceptions were derived, they are no longer data, as they were in the beginning, but they present themselves as problems to be solved by his scientific hypotheses. The task is then comparatively easy; he has only to invert his instrument, so to speak, and look through the other end. The inductive movement gives place to the deductive: out of the hypothesis which he has by induction constructed on the basis of the data, he derives the infallible answer to the problems constituted by the 'facts.' The brief sketch of primitive apperceptions, to which we must now turn, when compared with the proofs of the corpuscular theory and the phenomena explained by the application of the atomic philosophy in the poem of Lucretius, furnishes a good illustration of this dialectic cycle.

The primitive Greek saw in nature the play of daemonic beings: the religion of the people, however much glossed over by the Homeric and post-Homeric tradition, was at bottom one of magic and of occult powers. Spirits were everywhere, and spirits were believed to be chiefly of chthonic origin. The evidence, which is to be found in the handbooks, need not here be repeated. Every one is acquainted with such facts as that mephitic vapors were the objects of worship;¹ that

λεπτομερές, upon which early thinkers relied for their corpuscular theories. Therefore 'air' is prominent in the earlier age until, with the discovery by Anaxagoras that what we call air was not a void, ἀήρ came more and more to be used for atmospheric air. Then (perhaps first among the medici) πνεῦμα began to assume an important rôle, which it retained under various interpretations until the latest times. The problem of respiration (ἀναπνοή), cosmic and microcosmic, doubtless contributed much to its pre-eminence. Alongside πνεῦμα the Heraclitic (?) ἀναθυμίασις maintained its position largely through the influence of Aristotle and the Stoics. The name ἀπορροιαί, used by Empedocles, was subsequently more or less superseded by ἀποφοραί, which becomes the generic term with Asclepiades, possibly under the influence of Strato. See Sext. Empir., *Math.* 3, 5, Diels, Anonym. Londin., *passim*, and Hero, *Pneumat. Prooem.*

¹ See Frazer, *Adonis, Attis and Osiris*, p. 113 f. See above, p. 120, n. 6.

Plutonia, Charonia, or hell-gates, where vapors or hot-springs issued from the earth, were sacred,¹ because the exhalations were regarded as spirits, — spirits of the dead. It was to these spirits that women looked for fertility,² and mankind for increase of flocks and herds and for the fruitfulness of the soil.³ From Hades, we are told, or from the dead, come not only the souls of the living, but also life, nourishment, growth, and the seeds of fruitfulness.⁴ The spirits of the winds are earth-born, and lord it over the surface of the earth.⁵ It is to the occult influences which they exercise that tabooed objects owe their sacredness.⁶ The Pythia derived her inspiration partly from the aroma of the laurel, chewed and burned, and partly to the vapors issuing from the fissure above which her tripod was placed.⁷ Smoke and aromatics were quite generally regarded as producing 'enthusiasm' or possession by the god-head.⁸ Aromatics, which possess the power of throwing off continuous streams of effluvia without perceptible diminution, had great significance to Greek thought, although it has been generally overlooked. The Fountain of Youth in Ethiopia, described by Herodotus,⁹ was, like the

¹ Rohde, *Psyche*, I, p. 213, n. 1. Cf. Preller-Robert, *Gr. Mythol.* I, p. 811 f., I, p. 283-286. See above, p. 120, n. 6.

² See Rohde, *Psyche*, I, p. 246 f.

³ See Dieterich, *Mutter Erde*, *passim*.

⁴ Hipp. II. *διατρης*, 4 (II. *ἐνυπνίων*), 92 (6, 658 L.): τοὺς δὲ ἀποθανόντας ὄρην (i. e., in dreams) καθαρὸς ἐν ἱματίοισι λευκοῖσιν ἀγαθόν, καὶ λαμβάνειν τι παρ' αὐτῶν καθαρὸν ἀγαθόν· ὑγίην γὰρ σημαίνει καὶ τῶν σωμάτων καὶ τῶν ἐσιόντων· ἀπὸ γὰρ τῶν ἀποθανόντων αἱ τροφαὶ καὶ αὐξήσεις καὶ σπέρματα γίνονται· ταῦτα δὲ καθαρὰ ἐστέρειν ἐς τὸ σῶμα ὑγίην σημαίνει. Schol. B L II. O, 188: ὁ "Αἰδης οὐ μόνον τὰς ψυχὰς συνέχει, ἀλλὰ καὶ τοῖς καρποῖς αἰτιῶς ἐστὶν ἀναπνοῆς καὶ ἀναδόσεως καὶ αὐξήσεως. Even if καρποῖς be sound, the statement applies to ζῶα as well as to φυτά; for, while ἀναπνοή (respiration) and ἀνάδοσις (here apparently not *growth*, but distribution or assimilation of food), as well as αὐξήσις, may properly be predicated of plants according to Greek ideas, yet the terms, taken by themselves and in conjunction with the citation from Hippocrates, suggest animals as well. See also Rohde, *Psyche*, I, p. 208, n. 4.

⁵ Rohde, *Psyche*, I, 247 f. See p. 118, n. 4.

⁶ Cf. Farnell, *Cults of the Gr. States*, III, p. 132.

⁷ See Bethe, *Die Dorische Knabenliebe*, *Rh. M.* LXII, pp. 438-475. The doubts recently cast upon the ancient testimony regarding the fissure and the vapors at Delphi are far from convincing to one who has seen the remains of the temple.

⁸ Rohde, *Psyche*, II, p. 60 f.

⁹ Herod. 3, 23. Cf. the vapor-bath (πυπλή) of the Scythians, Herod. 4, 75.

incense, the pleasant savor, and the ambrosia on which the gods fed,¹ aromatic and so ethereal as to be almost comparable to a vapor-bath; the foods partaken at the wedding-feast and at the sacramental meal of the Mysteries are all pungent or aromatic, as are also the herbs laid beneath the dead at funerals.

But it is a bad rule that does not work both ways. The same exhalations which are welcome to one being will prove to be unwelcome to another. What is one daemon's poison is another's meat. Thus exhalations or effluvia of various kinds are the chief apotropaic and purificatory means employed in the most diverse circumstances. It is curious that Gruppe² has failed to note the significance of the mass of material he has gathered. We observed above that to the Greek philosophers from Empedocles onward, and probably from the beginning, perception by all the 'five' senses was mediated by effluvia: sight by the streams of particles emitted from the surfaces of things, hearing and smell by other emanations. Taste was not sharply distinguished from smell, both going for a while by the same name,³ since they are not easily dissociated unless one close the nostrils. Touch included, and probably originally designated chiefly, the temperature sense, which is affected by heat and cold. Both heat and cold were regarded by early Greek thought, and even later in the popular mind, as effluvia.⁴ Indeed, fire was distinctly the typical instance of emanation (*ἀναθυμίασις*), insomuch that Theophrastus could object to the general theory of effluvia that fire was the only element which gave them off. Now it is hardly a mere coincidence that the various apotropaic and purificatory means employed to rid oneself of the malign influence of the daemons fall naturally into classes which emphasize the marked emanations peculiarly adapted to

¹ Cf. Democritus, fr. 25: ἀμβροσίαν δὲ τὰς ἀτμίδας αἷς ὁ ἥλιος τρέφεται, καθάπερ δοξάζει καὶ Δημόκριτος.

² *Gr. Mythologie u. Religionsgeschichte*, II, p. 886 f.

³ That is, ἡδονή. Cf. Arist., *De Sensu*, 4 *init.*, and Heraclitus, fr. 67, Anaxagoras, fr. 4, Diogenes of Apollonia, fr. 4.

⁴ The 'penetrating' power of heat and cold was especially prominent in the thought of the Greeks; hence, particularly in the case of heat and fire, their ability to divide and 'atomize' things was often dwelt upon. Since ἀναθυμίασις epitomized the cosmic process, the action of the heat of the sun or of the outer circle of fire upon the more compact inner circles was viewed chiefly as rendering them λεπτομερές. See above, p. 119, nn. 2 and 11, p. 120, nn. 1 and 10.

the senses. Of course every sensible object must somehow fall upon the senses; but that is no objection to the point here taken. Sunlight, as the power of a superior god, is itself purifying;¹ fire again is the purifying and apotropaic agency *par excellence*, as possessing the most evident and most various emanations. Loud noises and the means, chiefly metallic, of producing them, are considered especially effective; but hardly less the effluvia which strike the sense of smell. 'The daemons love not the reek of torches.'² The purificatory use of sulphur is known to Homer.³ During the great plague at Athens they burned 'sweet-smelling wood.'⁴ Almost all cathartic simples known to the materia medica of the Greeks possess a strong odor, rank or aromatic; wines are diuretic, diachoretic, or constipating according as they are aromatic or not;⁵ flatulent (πνευματώδης) food was tabooed by the Pythagoreans and Empedocles.⁶ The efficacy of olive oil as a daily unguent and at burial was no doubt partly due to its aromatic properties: hence also the use of it, or of wine, in the first bath given to the infant, and subsequently in Christian baptism. Nor should we overlook the extensive use of fumigations by Greek physicians; such as

¹ I cannot recall a passage which clearly and expressly states this fact, but it seems to me obvious from a number of considerations. First, the part of the temple in which the cult-statue was placed was often open to the sun, and to be under a roof with an unexpiated criminal brought on community of taint; corpses were to be hid from the light of the sun, to avoid defiling it—presumably as a source of purity. It was to Delphi that Orestes and other mythical personages went to be purified by Apollo, god of the sun. See Fairbanks, *Greek Religion*, p. 236. The Lacedaemonians killed no one by day, Herod. 4, 146. Parmenides, fr. 10 spoke of καθαρὰς εὐαγέος ἡελίου | λαμπάδος, on which see Diels, *Parmenides Lehrgedicht*, p. 103 and other passages cited there. Again, in the medical writers the advantages to a site of exposure to the sun are often noted, although it was of course known that in certain cases too much exposure to the sun might prove harmful to a man. Cf. εὐήλιος, and Varro, *R. R.* 1, 12, 3, Sen. *N. Q.* 3, 19, 2, and the Italian maxim, 'Dove non va il sole, ivi va il medico.'

² Plato, *Phaon*, apud Athen. 10, 58, 442 A.

³ *Od.* 22, 481, *Il.* 16, 228.

⁴ Acron, fr. 3 (Wellmann, *Fr. d. gr. Ärzte*, I, p. 109).

⁵ See Hipp. II. *διατρης*, *passim*. Cf. Kuhn's *Zeitschr.* XIII (1864), p. 122 f. Beans and laurel were cathartic, cf. Rohde, *Psyche*, II, p. 181, 2.

⁶ Cf. Iambl. *V. P.*, 106. Pythagoras also forbade the use of wine, *ibid.*, 107. Cf. Wellmann, *Fr. d. gr. Ärzte*, I, p. 30 f. note, and Hipp. II. *διατρη* 2, 45 (6, 542 L.).

the internal fumigation of women after childbirth¹ and as an emmenagogue.² Finally, water, a universal means of purification, doubtless owed its power in part to the abundant evaporation, which connected it on the one side with the fructifying spirits³ which give fertility, and on the other side with apotropaic functions.⁴

The connection of the soul with the system of effluvia has already been touched upon. Indeed, when one has shown that the spirits of the dead were viewed as vapors, one has said all that is necessary. But it may be well to emphasize this point because of the light which it throws on the general question. Rohde's careful and illuminating study has abundantly shown that to the Greeks the soul ($\psi\upsilon\chi\acute{\eta}$) was a vapor ($\pi\nu\epsilon\upsilon\mu\alpha$ or $\alpha\nu\alpha\theta\nu\mu\acute{\iota}\alpha\sigma\iota\varsigma$). With the breath it enters and with the breath it departs. Like the exhalations of the Plutonia, it tends upwards. In the Sicilian school of medicine we meet with the doctrine that the body is of the earth, earthy, and therefore heavy and inert: the soul, akin to the active fire, levitates the clod and gives it motion and life.⁵ But as evaporation tends upwards, so it is again precipitated; and exactly parallel to the 'way up and down' which sums up the physical cycle of birth and death, the Orphic cycle of necessity in Plato's *Republic*⁶ pictures the souls as ascending and descending. There were many, of course, who held that the soul did not enter the body at birth, but that the embryo became animate at various stages of its development. They had in consequence to provide for breath or vapor in the womb, which was easily done, since the respiratory and the vascular systems were thought to be intimately connected and since the latter were by many held in part to contain $\pi\nu\epsilon\upsilon\mu\alpha$. In any case there was never any serious question of the connection of the soul with vapor or breath. Hence,

¹ This was practised until far into the 18th century.

² Diels, *Anonym.* *Londin.* 37, 30 f.

³ Compare the bridal bath and the bath with fragrant wine to cure sterility. With this should be compared the sprinkling of water as a rain-charm, probably on the principle of sympathetic magic that the resulting $\alpha\nu\alpha\theta\nu\mu\lambda\alpha\sigma\iota\varsigma$ would result in a corresponding precipitation.

⁴ Gruppe, *op. cit.*, II, p. 888 f.

⁵ See Diocles., fr. 17 (Wellmann, *op. cit.*, I, p. 124). With this compare the function of fire in Empedocles, fr. 62, 6.

⁶ In the vision of Er, son of Armenius, 614 B f.

as in the story related of Democritus,¹ the soul or life might be artificially maintained by inhaling the vapors of steaming loaves fresh from the oven or by similar devices. Asclepiades, we are told, interpreted this supposed fact as a stimulation or rousing of the soul,² probably regarding it as similar to the case of awakening, in which the soul, reduced to a low ebb in sleep, is reinforced by the accession of breath (*πνεῦμα*) from without. According to Heraclitus,³ apparently, the soul in Hades directly receives the vapors into itself and whiffs odors, very much as the wraith-like Epicurean gods are maintained by the accession of atoms. As the Atomists⁴ found in the motes visible in sunbeams analogues of their atoms, the Pythagoreans saw in them either souls or that which moved the soul.⁵

We see, then, that the Greeks identified roughly soul and vapor. Identification in the strict sense is not the work of practical but of theoretical intelligence. When one formulates the thoughts of everyday life the result is a judgment, in which the subject is particular and the predicate general. It thus registers the direction of interest, since it indicates at once the matter which engages the attention and the universal to which it is referred in the naïve belief that the act of reference is an explanation. Identical or convertible propositions, in which either term may be subject and either term predicate, would seem to arise as the result of the conjunction of two distinct movements of thought; or, to state it otherwise, strict identification of terms is possible only to reflection when, assuming the attitude of the critic, it

¹ Diels, *Anonym.* Londin. 37, 34 f.

² *Ibid.*, 37, 54 f.

³ Fr. 98. Cf. Plut. *de Fac. in orbe lunae*, 28, p. 943, who quotes the passage. Probably this thought was in part suggested by the ancient practice of setting marjoram and *λήκυθοι* of myrrh under the corpse at the *πρόθεσις*, on which see Rohde, *Psyche*, I, p. 219, and Bekker-Göll, *Charikles*, III, p. 124, Dieterich, *Nekyia*, p. 74, n. 5. See also Plut. *de Sera num. vind.*, 22 in the Aridaeus-Thespesius myth, where the souls feast on odors. An interesting illustration occurs in II *Cor.* 2, 16, with which cf. *Eph.* 5, 2. Reitzenstein, *Hellenistische Mysterienreligionen*, p. 52, has not seen the full force of this. God, as *πνεῦμα*, smells sweet savors (*Gen.* 8, 21, cf. the Homeric *κλίση*); and since the true Christian is *πνευματικός*, that which feeds (or pleases) God, will feed him also, whereas to the *φυσικός* it is a pestilential breath from the grave.

⁴ Arist. *de Anima*, 403^b 28 f.

⁵ Arist. *ibid.*, 404^a 16 f. and Themistius, *ad loc.*, 9, 27.

seeks an evaluation of one course of thought or action in terms of another. Returning to the question in hand: the Greek of the animistic stage said 'vapor is soul,' since 'soul' was his universal. When the proposition was stated the other end to: 'soul is vapor,' the terms were not strictly equated. The new judgment expresses the new consciousness which inevitably led to philosophy. And when one notes the extension of the term vapor (*ἀναθυμίασις*) and the facts for which it provided the acceptable predicate, it is clear that philosophy was predestined to assume the form of a corpuscular theory of the world. So far as we can tell, soul and vapor were never absolutely equated; but in the philosophical thought of the Greeks the materialistic (and mechanical) direction registered in the primitive judgment 'soul is vapor' was destined to prevail, even where it proved logically incompatible with the superficial teleology imported in the Socratic period.

We must now turn to the consideration of a number of phenomena which are of a physiological nature. It is not necessary to debate the old question whether cosmological or physiological questions first engaged the attention of Greek philosophers; for we are clearly not yet in a position to arrive at an intelligent answer. Here as everywhere the study of the history of special problems must precede the general statement of results. But there is a question on which one must arrive at some conclusion before discussing the points which are presently to be treated: to wit, What was the relation between philosophy and medicine in Greece? It has been the common view that medicine was wholly dependent on philosophy, wherever there is a clear dependence of one on the other; a view apparently justified by a number of works included in the *Corpus Hippocrateum*. It is true that there is a certain eclecticism to be noted in them and a striving to accommodate the views of the author to those of contemporary or earlier philosophers. Yet this dependence has probably been much overstated by even the most careful investigators. Two points should be well considered. First, our knowledge of Greek medicine in the fifth century is limited. In spite of the volume of 'Hippocratean' writings we know from indications contained in this very literature and from the list of names of other physicians whose works are utterly lost that we possess only a small fragment of the medical literature of the time. So impenetrable is the darkness that there is little hope of a successful issue to the per-

sistent efforts being made to assign the existing works of 'Hippocrates' to the several schools then flourishing, not to speak of the impossibility of deciding which, if any, of the extant works are to be attributed to Hippocrates himself. Then, again, we must bear in mind that the physician was a recognized craftsman even in the Homeric age,¹ and that the medical tradition, mediated by the guilds and priesthoods, must have preserved elements from a period antedating philosophy. 'Hippocrates' speaks of the ancient and honorable art of medicine, and we have every reason so to regard it. Such being the case, it must appear to be a hazardous assumption that where there is an obvious dependence of one upon the other, medicine must always be the borrower. It is surely wiser to suspend judgment, at least for a time, than to take for granted, for example, that Empedocles is to be credited with the origination of all the doctrines in which the Sicilian school agrees with him.² Such caution is the more to be recommended because there are points of doctrine in which Empedocles and Anaxagoras agree not only with one another but also with a clear medical tradition not necessarily dependent on them. And when one notes that these points of agreement relate in part to physiological processes which primarily concern the physician, such as the process of nutrition, one is the more inclined to a prudent *non liquet*; for the exigencies of prescribing medicine or diet must early have compelled the physician to formulate some theory, if indeed he had not such a theory ready to his hand in the common assumptions which he shared with the people at large.

Among the physiological processes to which we desire to draw attention is that of waste and repair. This applies to the cosmos, which the Greeks quite generally regarded as a living organism (ζῶον), quite as

¹ *Od.* 17, 383 f. Cf. Plato, *Rep.* 599 C. We should not forget Democedes, the most illustrious representative of the Crotoniate school, who served as court physician to Pisistratus, Polycrates, and Darius. His father belonged to the Cnidian school, and Democedes is said to have written a medical treatise. All indications point to a long development, although the links of the chain are generally missing. See Diels, *Vorsokr.*², p. 32 f.

² So Wellmann, *Fr. der gr. Ärzte*, I, *passim*. See, e.g., p. 35 in regard to embryology and gynecology, where he accepts the conclusions of Friedrich's *Hippokratistische Untersuchungen*, Berlin, 1899.

much as to the microcosm. In both alike continued existence depends on the maintenance of a proper balance between receipt and expenditure. The losses go by the name of ἀπόκρισις or ἔκκρισις, accessions by that of εἰσκρισις. During a part of life the latter are in excess of the former and the organism experiences growth (αὐξήσις); when the ratio is inverted it suffers loss (φθίσις). The beginning of growth is origination (γένεσις), the consummation of loss is destruction (φθορά). Since, as we have seen, Greek thought did not conceive of origination as creation *e nihilo*, nor of destruction as annihilation, γένεσις and φθορά are strictly in line with growth and decay and relative to the particular entity which, like all things perfect, for the Greek had beginning, middle, and end. The middle represents the attainment of the meridian of life when the functions, like the sun in his course, seem for a space to stand still in perfect balance (ἰσορροπία).

Both waste and repair are effected partly in the gross; but with this aspect of the functions Greek theory concerned itself but little, since it marks only the beginning and end of the respective processes. Essentially each consists in the addition or removal of minute particles, without which the various operations could not be conceived. We do not know when this fundamental fact first arrested the attention of Greek thinkers: but certain factors of the problem were assuredly a portion of man's earliest thought. That breath, both as inhaled and as exhaled, was material and composed of minute particles; that food, in order to subserve its purpose, must be masticated or comminuted; that there were channels for the reception of breath and of food; and that both found their way somehow into the recesses of the body,—these are observations which did not await the dawn of philosophy or of scientific medicine. Alcmaeon, in the sixth century B.C., used the term 'pores' (πόροι) of the channels of sense,¹ and doubtless of the other ducts of

¹ See Diels, *Vorsokr.*², p. 101, 18 and 29 f. (hearing), *ibid.*, 21 f.: *μανότητα* (taste), *ibid.*, 24 f.: *ἀπάσας τὰς αἰσθήσεις συνηρηθῆσθαι πως πρὸς τὸν ἐγκέφαλον . . . ἐπιλαμβάνειν γὰρ τοὺς πόρους, δι' ὧν αἱ αἰσθήσεις*; *ibid.*, 32 f. (goats breathing through the ears, probably to explain hearing); *ibid.*, 34 f. (for smell); *ibid.*, 42 and p. 102, 1 (sight). These πόροι are not empty, p. 101, 44: *naturalem spiritum continentes*. That Alcmaeon used πόροι also of other ducts is made highly probable by Arist. *de Gen. animal.* 744^a 8 f., and the same conclusion naturally follows from his pronouncements concerning the nutrition of the embryo (*Vorsokr.*², p. 103, 11 f.), which takes in nutriment 'like a sponge,' and concerning sleep and death (*ibid.*, 16 f.).

the body. How much earlier they may have borne this name we do not know; but, although dissection may not have been practised before Alcmaeon, we know that the Greeks had long been accustomed in the slaughter of animals for sacrifice to observe minutely the condition of the inner organs. Under these circumstances it is inconceivable that they should not have studied the anatomy of the victims with a view to throwing light on human physiology, particularly since the early history of the science is marked by inferences—often erroneous—drawn from the analogy of certain animals. We may be sure, therefore, that the principal facts of physiology upon which the theory of waste and repair is based were known to the Greeks not later than the beginning of the sixth century B.C.

This process was known as that of nutrition (*τροφή*). It may at first appear strange that respiration (*ἀναπνοή*) was regarded by the Greeks as a variety of nutrition alongside *τροφή* in the narrower sense. But the fact is well attested,¹ and even if it were not, the close analogy of the two functions as well as the intimate connection of the respiratory and vascular systems, particularly as understood by the Greeks, would force us to this conclusion. Apparently at an early period food proper was roughly divided into 'dry' and 'moist,'² although it was well understood that in order to become a nutrient all food must be liquefied, wherefore water was regarded either as the nutrient *per se* or as the vehicle of nutrition.³ If now we recall that breath, itself a form of

¹ See, e. g., Hipp. II. *τροφῆς*, 30 (9, 108 L.): ἀρχὴ τροφῆς· πνεύματος, ῥίνες, στόμα, βρόγχος, πλεύμων, καὶ ἡ ἄλλη διαπνοή· ἀρχὴ τροφῆς καὶ ὑγρῆς καὶ ξηρῆς, στόμα, στόμαχος, κοιλίη· ἡ δὲ ἀρχαιοτέρη τροφή, διὰ τοῦ ἐπιγαστροῦ, ἢ ὀμφαλός. Clearly breath and blood are the only true *τροφή*, all other nutrients must be first reduced to blood: cf. Galen, *ad loc.*, 15, 388 K.: καὶ διὰ τούτων οἶον ἐκ πρέμνων τινῶν ἐκ τῆς μήτρας ἔλκει τὸ ἔμβρυον αἷμα καὶ πνεῦμα, ὕπερ Ἰπποκράτης ἀρχαιοτέραν καὶ πρωτίστην τροφήν καλεῖ. See above, p. 132, n. 1.

² See Hipp. II. *τροφῆς*, 1 (9, 98 L.) and 30 (quoted in preceding note). Henceforth it became a commonplace.

³ Athen. 2, 18 (43): καὶ ἡμῶν δὲ πᾶσα δύναμις ἐξ ὑδάτων ἀρδεται. Hipp. II. *τροφῆς*, 55 (9, 120 L.): ὑγρασίη τροφῆς ὄχημα. Blood is the *ὑγρασίη* of the body (see above, n. 1) and is according to Empedocles the real nutrient of animals as water is of plants. Cf. also Aristotle, *de Part. animal.* 651^a 14 f. Moisture, as we have seen, is the nutrient *par excellence* of fire: cf. Hipp. II. *διατρῆς*, 1, 3 (6, 472 L.) and Theophr. *de Igne*, 20. These facts are closely connected, because food is changed by the native heat of the organism (by 'cooking,' *πέψις*) into *ἀναθυμίασις*,

nutriment, was considered 'cold' as inhaled, and 'hot' as exhaled, we obtain in the classification of the nutrients of the organic body the generic contrarieties postulated, according to ancient authorities,¹ as the primary distinctions arising out of the Apeiron of Anaximander, and henceforth destined to play a foremost part in the philosophy of Greece.²

It is quite natural therefore that vapor should have been spoken of as breath; for the earth and the sea were commonly conceived in the familiar way as breathing,³ now exhaling warm vapors and again receiving back the cooling showers. This is poetry; but poetry has ever been the elder sister of philosophy. Breathing to the Greek was not, however, restricted to respiration (*ἀναπνοή* and *ἐκπνοή*); it included also 'perspiration' (*διαπνοή*). The living creature breathes at every pore.⁴ We know the theory of Empedocles, according to which breath surges out and in at the pores, 'the bloodless tubes of flesh extended over the surface of their bodies,'⁵ successively driving back and yielding before the recurrent blood. The pores are at no time empty,⁶ since each

in which form it passes through the minute ducts of the body, partly as *πνεῦμα*, partly as a saline precipitate (e. g., urine). These or similar views were widely held.

¹ Diels, *Vorsokr.*², pp. 13, 14.

² By Empedocles, or at least by the Sicilian school of physicians, these were regarded as the 'elements' of the body. Cf. Gilbert, *Meteorol. Theorien*, p. 340, n. 1, and Wellmann, *Fr. d. gr. Ärzte*, I, pp. 69-93.

³ Hom. *Od.* 5, 469: *αὔρη δ' ἐκ ποταμοῦ ψυχρὴ πνέει*, with which cf. Herod. 2, 19, and 27. Cic. *N. D.* 2, 10, 27: *Ipse enim <aër> oritur ex respiratione aquarum; earum enim quasi vapor quidam aër habendus est.* Sen. *N. Q.* 2, 10, 2 f.: *terrenas exhalationes . . . terrarum halitu.* That winds are breath or breathe is a commonplace from Homer onwards; cf. Hipp. II. *φυσέων*, 3 (6, 94 L.). We shall presently meet this conception again in cosmic respiration. The word *αὔρα* has interesting associations; thus Ar. *Av.* 1717 uses it of the fragrance of incense, and Opp. *Hist.* 4, 114, of the subtle influence of a female.

⁴ See above, p. 133, n. 1. Alcmaeon probably held this theory, see p. 132, n. 1. For a fuller statement of *διαπνοή* see Galen 5, 710; 6, 67; 15, 180; 19, 375 K. With it is, of course, connected also the 'sensible (as opposed to 'insensible') perspiration,' called sweat, a notion which Empedocles, fr. 55, likewise applied to the cosmos, calling the sea the 'sweat' of the earth.

⁵ Empedocles, fr. 100, transl. Burnet.

⁶ Again cf. Alcmaeon, above, p. 132, n. 1, and Hipp. II. *φυσέων*, 3 (6, 94 L.), where the water of the sea is said to contain air between its drops, which is breathed by fishes: *κενέον τε οὐδέν ἐστιν τούτου* (sc. *ἡέρος*). Cf. also my *Qualitative Change*, p. 356, n. 67.

adversary in turn presses hard upon the retiring foe. It is worthy of notice that the theory implies no separation between the vascular and the respiratory systems except at the surface, where the pores are of a size to admit of the free flow of air but to prevent the blood from following it. This theory is highly developed, and we cannot trace it earlier than Empedocles,¹ though it afterward found many supporters.² But we need not therefore conclude that Empedocles originated the several views which he perhaps first combined into a well-articulated hypothesis. Against this conclusion several considerations speak with cumulative force. First, the notion of 'perspiration' was evidently much older than Empedocles, at least as applied to the cosmos; and, secondly, the intimate connection of respiration and nutrition, upon which the Empedoclean theory rests, may with equal assurance be claimed as a discovery of an earlier age.

There is a passage in Hippocrates *Περὶ φύσιος παιδίου*³ which deserves to be quoted because of the light it throws on Greek conceptions relative to breathing. Although it relates to the human embryo, the process described is purely physical. After speaking of conception, the writer proceeds: 'The embryo collects and solidifies under the action of heat. Then it acquires breath, partly from being in a warm place, partly because the mother breathes; and when it is filled with breath, the breath makes a passage for itself outward through the middle of the embryo, whereby the breath escapes. Now, when a passage is made

¹ Yet, as we have just seen, there is a strong presumption that Alcmaeon held much the same view.

² See Wellmann, *Fr. d. gr. Ärzte*, I, p. 70 f.

³ C. 12 (7, 486 L.). With this passage cf. *Π. ὀκταμήνου*, 12 (7, 456 f. L.). The main duct of the foetus is of course that which connects with the umbilical cord. Ancient medical writers were not agreed whether all *τροφή* (including breath) entered by the cord. Alcmaeon, as we have seen, said that the foetus took in nourishment like a sponge, which implies many openings. *Π. ὀκταμήνου*, *loc. cit.*, expressly affirms that all other channels are closed until after birth. *Π. τροφῆς*, 30 (9, 108 L.), seems to take much the same view. The case of the chick in the egg in *Π. φύσιος παιδίου*, 30 (7, 536 L.), is very similar to that of the human foetus (c. 12), but the shell is supposed to admit sufficient air, and clearly not at any one point. *Π. διαίτης*, I, 9 (6, 482 L.), a distinction is made between periods; at first, when all is rarefied, food enters equally everywhere, but later, as the exterior of the foetus solidifies and condenses, special passages are formed. *Π. σαρκῶν*, 6 (8, 592 f. L.), the foetus inhales and sucks in the womb, clearly not by the cord.

outward for the warm breath, cold breath is inhaled in turn from the mother; and this occurs continually. For, being in a warm place, it becomes warm; it derives cold (air) from the mother's breathing; and everything that becomes warm obtains breath.¹ The breath breaks and makes a way for itself and goes out: but that which is warmed of itself again draws cold breath to itself through the passage it has forced, and by it is fed.² This may be observed in wood and leaves, in food and drink, in fact in anything that becomes very warm. Burning wood will furnish a good illustration: for all kinds of wood will do it, most of all that which is somewhat green. It emits breath at the point where it was cut, and the breath when it goes forth circles round the cut: a thing we see continually occurring. The inference in regard to the breath is evident, viz., that when it is warm in the wood it draws in to replace itself³ other air that is cold, by which it is fed, and again expels it. . . . These natural laws are adduced to prove that the embryo inhales and exhales breath. At the same time it gets breath from the mother's respiration; for when she draws cold breath from the air, the embryo partakes of it.' The origin of the membrane which encloses the foetus is next described.⁴ Now it is clear from this account that the physiological process is here, as in Empedocles, conceived in terms of inanimate nature, only strictly mechanical principles being involved. Yet the materials burned in the fire are all organic products and hence possess the pores necessary for the circulation of air, which the author regards as breathing.

Two points are noteworthy in this account of respiration. First, it is obviously due to the expansive and rarefying action of heat, which is checked and compensated by the contracting and condensing power of cold. That upon which the heat of the womb acts is also clearly the moisture in the foetus, which, becoming heated and converted into vapor,

¹ Cf. Arist. *de Respir.* 472 f.

² Note here the use of *τρέφεται* and *τροφή*, as it continually occurs in Hippocrates (e. g., II. *σπαρκῶν*, *passim*) in speaking of respiration.

³ *ἐπιστῆ*. Here is a case of *ἐλξίς* or *ὀλκῆ*, but it is purely mechanical, based on the *horror vacui*. When Plato (*Tim.* 80 A. f.) criticises the use of *ἐλξίς*, he is merely objecting to a term which seems to him susceptible of a wrong interpretation. He did not introduce a new conception.

⁴ Cf. Hipp. II. *σπαρκῶν*, 3 f. (8, 586 f. L.).

forces a passage outward, thus establishing a means of communication with the outer air. There is no mention of many such vents established, but we need not conclude that only one is thus formed: the writer has in view the principle involved, which remains the same whether there are many or one. In the second place, this process involves the notion of an integument which is more or less dense and requires to be opened at certain points to admit of the egress and ingress of air. In the embryo this is provided by the surrounding membrane, just as the cosmos has its firmament.¹

We are therefore prepared to understand the conception of cosmic respiration. The circulation of matter within the universe, analogous to that of the warm breath or the blood in the embryo, we have seen typified by 'the way up and down' of evaporation and precipitation. The analogy of the microcosm, however, inevitably suggested that this process needed to be supplemented by another. Just as the circulation of the vascular system is dependent on respiration (including perspiration through the innumerable cutaneous pores), so the world also must be thought of as breathing. This must have appeared the more necessary because of the fact that the world, regarded as an animate being (ζῶον), could hardly be conceived as continuing its existence without being fed. Accordingly we find Anaximenes in the sixth century supplementing his theory of the way up and down in the world with the conception of cosmic respiration. 'As our soul,' he says,² 'being vapor holds us together, so do breath and vapor surround the whole world.' When it is said³ that Xenophanes denied that his cosmos-god breathed, the meaning is clear. He must have held that, since the world was without beginning and end, and perfect, lacking nothing, there was neither need nor place for the breathing of the cosmos, which serves to maintain it, as food and breath repair the losses of the body. That such was indeed

¹ This is conceived as a ὑμήν in the cosmogony of Leucippus (Diels, *Vorsohr.*², p. 343, 10, 14 f.). With this cf. Hipp. II. σαρκῶν, 3 (8, 586 f. L.), and II. φύσιος παιδίου, 12 (7, 488 L.). In the former passage read ταῦτα καταληφθέντα περὶ αὐτὰ (αὐτὰ L.) σηπεδόνas ποιέει ολονπερὶ (ολον περὶ vulg.; οἶον περ L.; cf. Plato, *Theaet.* 201 E) χιτῶνας.

² Fr. 2.

³ Diog. L., 9, 19: οὐσίαν θεοῦ σφαιροειδῆ, μηδὲν ὅμοιον ἔχουσαν ἀνθρώπῳ· ὅλον δὲ ὁρᾶν καὶ ὅλον ἀκούειν, μὴ μέντοι ἀναπνεῖν.

the thought of Xenophanes is made doubly sure by a passage in Plato's *Timaeus*¹ which seems not to have been considered in this connection. In all this there is prominent the conception of insensible but cumulatively significant loss to the organism by the constant stream of effluences. In the third century Erasistratus² seems to have constructed the first crude 'respiration-calorimeter' in order to measure the extent of this loss. He took hens and other fowls and placed them in a jar, first feeding and weighing them carefully; after a time he took them out and again weighed them together with the visible excreta. The difference measured the amount of 'insensible perspiration.' Anaxagoras likewise clearly held the doctrine of cosmic respiration, for therein he finds the *Nous*, by which all within the world is ordered. 'The *Nous*,' we read,³ 'which ever is, is certainly there where everything else is, in that which surrounds the cosmos, as well in what has been added⁴ (to the Infinite) as in that which has been separated off from it.' *Nous* is in short like the 'soul,' which enters and leaves the organism with the breath.

¹ 32 C-33 A. Cf. 33 C: ὁμμάτων τε γὰρ ἐπεδείτο οὐδέν, ὁρατὸν γὰρ οὐδὲν ἀπελείπετο ἔξωθεν, οὐδ' ἀκοῆς, οὐδὲ γὰρ ἀκουστόν· πνεῦμά τε οὐκ ἦν περιεστὸς δεόμενον ἀναπνοῆς, κτλ. Cf. also Aët. 2, 5, 1 (*Dox.* 332 f.): [πρόθεν τρέφεται ὁ κόσμος] Ἀριστοτέλης· εἰ τρέφεται ὁ κόσμος, καὶ φθαρήσεται· ἀλλὰ μὴν οὐδεμιᾶς ἐπιδείνεται τροφῆς· διὰ τοῦτο καὶ ἀλδιος. Achilles, p. 128 E (*Dox.* 332 f.): Ἀριστοτέλης δὲ μὴ δεῖσθαι τροφῆς αὐτὸν λέγει, τὸ γὰρ δεόμενον φθαρτόν. ὁ δὲ ἀλδιὸς ἐστὶ κατ' αὐτόν. The same point of view obtains in the opposite opinion of Epicurus, Aët. 2, 4, 10 (*Dox.* 331): Ἐ. πλείστοις τρόποις τὸν κόσμον φθείρεσθαι, καὶ γὰρ ὡς ζῶον καὶ ὡς φυτὸν καὶ πολλαχῶς.

² Diels, Anonym. Londin. 33, 43: πρὸς δὲ τούτοις καὶ Ἐρασιστράτος πειρᾶται κατασκευάζειν τὸ προτεθέν. εἰ γὰρ λάβοι τις ζῶον οἷον ὄρνιθα ἢ τι τῶν παραπλησίων, καταθόητο δὲ τοῦτο ἐν λέβητι ἐπὶ τινὰς χρόνους μὴ δοὺς τροφήν, ἔπειτα σταθμήσαιοτο σὺν τοῖς σκυβάλοις τοῖς αἰσθητῶς κεκενωμένοις, εὐρήσει παρὰ πολὺ ἔλασσον τοῦτο τῷ σταθμῷ τῷ δηλονότι πολλὴν ἀποφορὰν γεγενῆσθαι κατὰ τὸ λόγῳ θεωρητόν.

³ Fr. 14.

⁴ The reading here and below is at first sight strange, though the sense is clear. Adam, *The Religious Teachers of Greece*, p. 257, n. 3, proposed ἀποκριθεῖσι for προσκριθεῖσι and ἀποκρινομένοις for ἀποκεκριμένοις. But Adam probably misconceived the point of view, which seems to be here (as in fr. 4, *Simpl.*, *Phys.* 156, 4: πρὶν δὲ ἀποκριθῆναι κτλ.) that of the πολὺ περιέχον, in which πάντα ἦν ὁμοῦ. Cf. also ἐπέκκρισιν, Diels, *Vorsokr.*², p. 343, 15, where we, naturally taking the cosmos as our point of view, should expect ἐπέσκρισιν. See below, p. 139, n. 4.

In general conformity with the point of view here sketched are the doctrines of the Atomists and the Pythagoreans. Since the latter cannot be exactly dated, we shall consider the Atomists first. Aristotle says: ¹ 'It is for this reason too that they regard respiration as the function that fixes life's limit.² They think that the surrounding air presses together and expels the atomic bodies, which, because they are themselves never at rest, impart motion to animals; but that relief comes through respiration, because similar particles thereby enter into the body from without. These latter, by restraining the contracting and condensing element, prevent the spherical atoms which are already in animals from being entirely expelled. So long as they can do this, life continues.' With this statement we must take a few others relative to the world. 'A cosmos continues at the acme of its powers until such time as it is no longer able to take on anything from without.'³ Such additions are mentioned also in the brief cosmology ascribed to Leucippus,⁴ and afterwards in

¹ *De Anima*, 404^a 9 f., transl. Hammond.

² διὸ καὶ τοῦ ζῆν ὅρον εἶναι τὴν ἀναπνοήν. Since respiration is a kind of τροφή, it is natural to find the same language used of the latter; cf. *ibid.*, 416^b 13: τροφή· σώζει γὰρ τὴν οὐσίαν, καὶ μέχρι τούτου ἐστὶν ἕως ἂν καὶ τρέφεται. Further instances are cited below, *passim*.

³ Hippol., *Philos.* I, 13 (*Dox.* 565, 18 f.): ἀκμάζειν δὲ κόσμον, ἕως ἂν μηκέτι δύνῃται ἔξωθέν τι προσλαμβάνειν. With this compare August., *C. D.* 8, 2: non enim <Anaximander> ex una re sicut Thales ex umore, sed ex suis propriis principiis (that is, out of *semina certa!*) quasque res nasci putavit. quae rerum principia singularum esse credidit infinita, et innumerabiles mundos gignere et quaecumque in eis oriuntur; eosque mundos modo dissolui modo iterum gigni existimavit, quanta quisque aetate sua manere potuerit, nec ipse aliquid diuinae menti in his rerum operibus tribuens. How much weight one shall attach to this statement will depend on one's point of view. The doctrine of Anaximander as here stated is an exact prototype of that of Anaxagoras, excepting the Nous. But, even if we hold that Augustine confused Anaximander and Anaxagoras, the statement holds true of the latter. I believe also that in most particulars Anaxagoras did simply restate more explicitly the thought of Anaximander. For the ἀκμή cf. Diog. L., 10, 89; Lucr. 2, 1105 f.

⁴ Diels, *Vorsokr.*, p. 342 f. The cosmos originates (as in Anaximander and Anaxagoras) κατὰ ἀποτομήν ἐκ τοῦ Ἀείρου, and a πρῶτον σύστημα arises, which forms as it were a membrane (οἶον ὑμένα, cf. p. 137, n. 1) about itself. This 'membrane' or caul of the world receives additions: *ibid.*, p. 343, 14: αὐτόν τε πάλιν τὸν περιέχοντα οἶον ὑμένα αὐξεσθαι κατὰ τὴν ἐπέκκρισιν (cf. p. 138, n. 4) τῶν ἔξωθεν σωμάτων· δίνῃ τε φερόμενον αὐτὸν, ὧν ἂν ἐπιψαύσῃ, ταῦτα ἐπικτᾶσθαι. This relates to the 'childhood of the world,' when it is growing rapidly; in its decline the loss would be emphasized; see preceding note. Cf. the Atomist account of human respiration, Arist., *de Respir.* 472^a 5-18.

the Epicureans.¹ The opinions attributed by Aristotle to the Pythagoreans must be interpreted in the light of these conceptions. 'There need be no doubt whether the Pythagoreans postulate generation or not; for they obviously say that when the One had been constructed, whether out of planes or of superficies or of seed² or of something they are at a loss to name, straightway the nearest part of the Infinite was drawn in and limited by the Limit.'³ 'The Pythagoreans likewise said that there was a void and that into the outer heaven itself, as if breathing, the void entered with other elements and here delimits substances.'⁴ 'Aristotle states in the first book of his work on the Pythagorean philosophy that the heaven (cosmos) is one and that from the Infinite there are drawn in also time⁵ and breath and the void⁶ which ever delimits the spaces of all things.'⁷

¹ Cf. Diog. L., 10, 73 (growth and decay of a cosmos); 10, 98 (growth of one world at the expense of another). The *locus classicus* is Lucr. 2, 1105 to the end of the book. The same point of view is taken elsewhere, as 1, 998 f., 1037 f. See also 5, 91 f., 235 f. Zeller, *Phil. der Griechen*, III, A.³, p. 409, n. 6 has collected the passages. The connection of all this with τροφή (cibus) is clearly brought out by Lucr. 2, 1133 f. I do not recall a passage where it is spoken of as cosmic breathing, but in view of the recognized connection of ἀναπνοή with τροφή it makes no difference.

² It is evident that different Pythagoreans expressed themselves differently. When Aristotle says 'seed' he is thinking of the πανσπερμια, a conception which he applies indifferently to Atomists and Anaxagoras. It is known that the latter used σπέρματα in this sense (fr. 4); it is altogether likely that Democritus did (cf. Epicurus apud Diog. L., 10, 89). Since the notion of *semina certa* was so prominent in the thought of the Greeks, we may safely credit it also to the Pythagoreans (cf. above, p. 116, n. 3; p. 117, n. 1 and 3; p. 139, n. 3).

³ *Met.* 1091^a 13.

⁴ *Phys.* 213^b 22.

⁵ Just what the Pythagoreans meant by χρόνος is not clear; certainly it was not abstract 'time.' I incline to think that χρόνος in older Greek thought (e. g., Orphics, Pherecydes, etc.) meant the δίνη or that which caused the δίνη. 'Time' was regularly associated by the Greeks with the revolution of the heavens; and, to cite closely parallel conceptions, the Nous of Anaxagoras (which the cosmos inhaled from the Infinite, cf. p. 138, n. 3) had no other function but to start the δίνη, and it is the accession (respiration) of atoms from the Infinite which causes the δίνη also in the Atomic system.

⁶ The κενόν, as the collocation with πνοή suggests, here probably means atmospheric air (cf. Burnet, *Early Gr. Philosophy*², p. 120 f.).

⁷ Arist., fr. 196 Rose.

It would be superfluous, after setting forth these various conceptions of cosmic respiration, to emphasize the implication of a porous world which they involve and sometimes expressly assume. The pores thus postulated do not need to be empty; all that the theory requires is that they shall afford entrance and exit to the streams of breath or vapor created by the action of heat, partly passing out, partly entering to replenish the loss.¹ The elaborate system of pores and effluences presented in the doctrine of Empedocles does not postulate a void; the pores are filled with blood or air. Probably this was the general assumption; except that atmospheric air was loosely spoken of as a void until Empedocles and Anaxagoras proved that it was not.² Consequently we may, without too great improbability, assume that the Pythagorean doctrine reported by Aristotle, whose author we do not know, was older than Empedocles and Anaxagoras. And the theories of Alcmaeon, whose affiliation with the Pythagoreans is well known, countenance us in assigning it to the sixth century.³ The conversion of pores into void interstices between indivisible corpuscles was the work of the Atomists under the spell of Eleatic metaphysics.

The subject of respiration leads naturally to the more comprehensive theme of nutrition (*τροφή*). We have seen that respiration falls under the head of *ἀναθυμίασις*, which is the general term for the insensible effluences. But evaporation always implies a certain degree of heat. Hence we find fire or heat playing a prominent rôle in respiration. Generally the excessive native warmth of the body is regarded as creating an expansion⁴ which mechanically draws in the colder atmosphere to check it. Among the Atomists, who held that the soul (breath) was constituted of fiery atoms, the process was simply reversed; inspiration, or the inhaling of soul, imparts warmth and life to the inert frame composed of heavier and less mobile atoms.⁵ Hence, as we should expect

¹ This conception became the foundation of the philosophy of Heraclitus. See my *Qualitative Change*, p. 354. Plato, *Tim.* 43 A, beautifully expresses it: ἐπέρρντον σῶμα καὶ ἀπέρρντον . . . ποταμόν (cf. *ibid.*, 42 A: καὶ τὸ μὲν προστοί, τὸ δ' ἀπτοί τοῦ σώματος αἰτῶν, and Philoponus, *de Anima*, 282, 17 f. Hayduck).

² See Burnet, *Early Gr. Philosophy*², pp. 263, 309.

³ Burnet², *op. cit.*, p. 120 f. on other grounds attributes it to Pythagoras himself.

⁴ See the polemic of Diels, *Anonym. Londin.* 26, 31 f. against Erasistratus, who clearly represented in the main the older conception.

⁵ Cf. p. 128, n. 5.

from the philosophy of Heraclitus, which takes ἀναθυμίασις as its keynote and sees in fire the essence of all things, it is in the phenomena of fire as interpreted by the Greeks that we discover the best illustration of the processes of respiration and nutrition. Certain passages have already been cited in the foregoing discussion; but the fullest and best exposition is to be found in Theophrastus *De Igne*. Space will not admit of a further consideration here, although the treatise is in some respects the most satisfactory commentary on early Greek thought.

Several general observations should be made before taking up nutrition in the narrower sense. First we should remember that fire is the active or motive force in the world, and that moisture is *par excellence* the nutritive element: fire is fed by water.¹ But it is water in the form of vapor (ἀναθυμίασις) that feeds fire, and in the physiology of nutrition evaporation, under one name or another, played an important rôle. This was probably due to the need of accounting for the infinitesimal increments and decrements of growth and decay. In this connection it is well to recall that, according to another fundamental principle of Greek thought, growth is effected by the addition of like to like, or as it is also stated, a thing is constituted of that by which it is nourished. This would lead to strange conclusions but for another general belief, viz., that water as a nutrient is not, so to speak, chemically pure, but is the vehicle of the specific foods appropriate to individual organisms or organs. In other words, water, as a nutrient, is a mixture of all the ingredients suitable (οἰκεῖον) to the body. It may at first seem strange that the same should have been thought to be true also of the vapors rising from heated water; for we obtain chemically pure water by distillation. But there can be no doubt that such was the belief of the Greeks. If we look for evidence it is to be found in abundance in the medical literature dealing with nutrition; but we can readily understand it when we think of the illustration given by Lucretius² of the salt taste one has when walking by the seaside, or of the miasma that breathes

¹ This is the foundation of ἀναθυμίασις; for the sun draws (ἐλκεῖ) or drinks (ἐκπίνει) water or moisture: cf., e. g., Arist. *Met.* 983^b 23 f., Hipp. II. *διατρῆς*, I, 3 (6, 472 L.); *ibid.* 2, 37 (6, 528), 38 (6, 532 L.); Theophrastus, *de Igne*, 20. See my *Qualitative Change*, p. 340.

² 6, 928 f.

from a swamp.¹ When water evaporates the most volatile (λεπτομερέςτατα) parts, not necessarily pure water vapor, are carried upwards; the heavier, coarser parts (παχυμερέστερα) are separated off and remain behind.² Since growth can take place only by the addition of *corpora caeca*, the former include all true nutrients. The composition of water is generally regarded as due to the absorption of insensible particles taken from the earth or other substances through which it percolates.

The general statement which we have just given of the conceptions underlying Greek theories of nutrition naturally provokes questions which are not readily answered because there does not exist³ a comprehensive account of the matter. The histories of medicine are for such purposes worse than useless, and a first attempt, like that which is here made, cannot hope to be either complete or free from error. Yet every student of Greek thought will recognize the importance of the subject and will be indulgent to the inevitable shortcomings of a preliminary study. First we must distinguish two problems which are closely connected but have not the same history. The general problem of nutrition (θρέψις or τροφή) and growth (αὔξεις) was evidently broached very early and solved on the basis of primitive conceptions: the regulative principles governing the solution never greatly changed, and may be traced in slightly varying phraseology through the entire course of development. In time the detailed process of digestion (generally called πέψις) received attention, and the problems raised by it became so interwoven with the earlier one that it is difficult to disentangle them. This fact naturally escaped the later Greeks and consequently they read the later theories of digestion into the early

¹ Cf., e.g., Hipp. Π. διαίτης, 2, 37 (6, 528 L.): τὰ δὲ λιμναῖα καὶ ἐλώδεα ὑγραίνει καὶ θερμαίνει· θερμαίνει μὲν διότι κοῖλα καὶ περιεχόμενα καὶ οὐ διαπνέεται· ὑγραίνει δὲ διότι τὰ φύόμενα ἐκ τῆς γῆς ὑγρότερα, οἷσι τρέφονται οἱ ἄνθρωποι, τό τε πνεῦμα ὃ ἀναπνέομεν παχύτερον, διὰ τὸ ὕδωρ ἀπὸ τῆς ἀκινήσεως (which causes it to thicken). Rain-water, which they knew chiefly as standing in open depressions, was regarded as peculiarly liable to become putrid and viscous. In the passage just quoted, I incline to set a comma after ἀναπνέομεν, and to read δὲ for διὰ.

² Cf. Diels, Anonym. Londin. 25, 31 f., 32, 39 f. For the λεπτομερές in relation to the elements see Arist. *de Caelo*, 3, 5. Fire is there considered as traditionally πάντων τῶν σωμάτων λεπτότατον.

³ At least not to my knowledge. The best statements I have seen are those of Wellmann, but he had evidently not considered the problem as a whole.

conception of growth, thus creating much confusion. It will require prolonged study of all the ancient sources to clear up the questions involved; and this can be effectually accomplished only when the fragments of the several medical writers are edited and arranged in groups according to their respective schools.¹

Let us now return to the problem of nutrition or growth in the most general sense. At the outset we are confronted by a seeming contradiction in the preliminary statement given above. It was said that fire or heat is fed by water or moisture, and that like is fed by like. And yet, according to Greek notions, fire and water are opposites. This contradiction was felt in ancient times, and calls for discussion before we proceed; for, as we shall presently see, it contains in embryo the dispute of later times.² The earliest statement that like is not fed by like, but that nutrition proceeds on the opposite principle, occurs in the only half-serious argument of Plato's *Lysis*,³ where, after playing off against one another the old proverbs 'birds of a feather' and the Hesiodic 'potter to potter is foe and bardling to bardling,' we are told: 'the opposite, they say, is food for the opposite; for like would derive no advantage from the like.'⁴ When we study the context it becomes clear that Plato had only the old cosmological theories in mind; for of the examples of the mutual loves of opposites which he adduced⁵ that

¹ Max Wellmann, in his *Fr. der gr. Ärzte*, I (containing the fragments of Acron, Philistion, and Diocles, of the 'Sicilian school'), has made a notable beginning, the value of which is best known to those who try to work ground which he has not covered.

² This contrast gives occasion for Aristotle's discussion of τροφή, which we consider below. In it he attempts to do justice to both principles, which he reconciles by means of his panacea, ἀλλοτρωσις, saying that food in the crude state is 'opposite,' and in the digested form 'assimilated,' to the organism or organ nourished. This is the beginning of the dispute over digestion, which we shall consider later.

³ 215 E.

⁴ I considered this in my *Qualitative Change*, pp. 358 f., 369 f. I neglected there to refer to *Lysis*, 214 E, 215 E, and *Tim.* 57 A. The principle that only dissimilars can interact, which Aristotle attributes to his predecessors pretty generally, seems to have been first stated by Plato. The application of the principle to Xenophanes in [*Arist.*] *de M. X. G.* is clearly unhistorical, being a hybrid begotten of Parmenides, fr. 8, 6 f., and Plato's *Parmenides*, from which the author has derived most of his ideas. Plato, *Lysis*, 214 E, is clearly glancing at Diogenes of Apollonia, fr. 2.

⁵ τὸ μὲν γὰρ ξηρὸν ὕγρου ζέπιθυμείν, τὸ δὲ ψυχρὸν θερμοῦ, τὸ δὲ πικρὸν γλυκέος, τὸ δὲ ὀξύ ἀμβλέος (!), τὸ δὲ κενὸν πληρώσεως, καὶ τὸ πλήρες δὲ κενώσεως, καὶ τὰ ἄλλα οὕτω κατὰ τὸν αὐτὸν λόγον.

of the dry for the moist and that of the cold for the hot alone had any real connection with nutrition (*τροφή*) in Greek thought, the remainder being instances of the popular tables of contrarities.¹ With this statement we must compare that of Aristotle²: 'Since the same faculty of the soul is both nutritive and generative, we must first investigate nutrition; for it is by this function of nutrition that the faculty in question is distinguished from other faculties. *Nutrition is supposed to take place by the law of opposites*, although not every opposite is nourished by every other, but such opposites only as derive both their origin and their growth from each other. Many things are derived from one another, but they are not all quantitative changes, as, e.g., healthy from sickly.³ Nutrition is not applied to these cases in the same sense, *for while water is nutriment for fire, fire does not nourish water. The opposites of food and nourishment appear to apply particularly to simple bodies. There is, however, a difficulty here. For there are some who maintain that like is nourished by like, while others, as we said, affirm the converse of this, viz., that opposites are nourished by opposites, on the ground that like is incapable of being affected by like.*' At first glance this would seem to show that the doctrine of nutrition by opposites was one widely accepted and applied to physiological nutrition; but on a closer view we readily see that Aristotle had no one else in mind but Plato,⁴ and Plato, as we shall presently discover, applied the principle

¹ One is reminded at once of the *συστοιχίαι* of Alcmaeon (R. P. 66) and of the pleasurable changes noted by Heraclitus (see *Qualitative Change*, p. 358 f.). In Plato, *Symp.* 186 A f., the physician Eryximachus refers to Heraclitus in a similar connection.

² *De Anima*, 416^a 18 f., transl. Hammond.

³ This is not derived from Plato's *Lysis*, but it is one of the examples of Heraclitus, fr. 111: νοστος ὑγίειν ἐποίησεν ἡδύ, κακὸν ἀγαθόν, λιμὸς κόρον, κάματος ἀνάπαυσιν. Cf. [Arist.] *Eth. Eudem.* 1235^a 17: 'μεταβολὴ πάντων γλυκύ·' ἡ δὲ μεταβολὴ εἰς τοῦναντίον. Burnet, *Aristotle's Ethics*, n. on 1155^b 4 f., refers to *Lysis*, 215 E, as clearly of Heraclitean origin, and queries whether the man from whom Socrates claims to have derived his lore was Cratylus.

⁴ It is well known that Aristotle often says *ἐνιοί* or *τινὲς* when he has only Plato in mind; and there are other examples of his taking seriously what was merely said in jest or irony. His own reference to fire and water, and his recognition that the principle holds only for the elements, are proof positive that he was thinking of the *Lysis*. It is even likely that he added 'while water is nutriment for fire, fire does not nourish water' because Plato had said 'the dry desires the moist; the cold, the hot.'

only in the cosmological sense, himself employing the dictum 'like is nourished by like' in the most express terms when speaking of physiological nutrition.¹

We thus find two kinds of τροφή set over against each other. In the strict sense of the term it is applied to the nutrition of organic beings, where the principle 'like to like' holds,² while, as Aristotle himself recognizes,³ the principle of opposites applies only among 'simple' or elemental substances, such as fire and water.⁴ We have, therefore, only to consider whether even in the case of the feeding of fire by water there is an instance of opposite nourished by opposite. And stated so, we perceive that we have to do with the phenomenon of evaporation in which water passes, according to the common opinion of the Greeks, into a tenuous form, leaving its grosser constituents to descend in precipitation and adding itself as fire to fire; for in a true sense it is the fire emitted by the sun returning to its own.

Moisture, as we have seen, is the universal nutrient: remove it from wood, and what otherwise were good fuel decays and will not burn.⁵ Hence the traditional classification of foods as moist and dry⁶ (meat and drink) is conventional only and is not based on an absolute distinction. That which shall serve as nutriment must possess flavor, and flavor or taste is impossible without moisture.⁷ Moisture or water is

¹ *Tim.* 78 E-80 E.

² This is emphatically stated by Simplicius, *de Anima*, 114, 26 f., Hayduck, and Sophonias, *de Anima*, 61, 27 f., Hayduck.

³ *De Anima*, 416a 27 f., and Sophonias, *ad loc.*, 61, 25 f., Hayduck.

⁴ The case is quite parallel to that which I noted in *Qualitative Change*, p. 369 f., where Theophrastus failed to distinguish between one set of phenomena in which Anaxagoras recognized interaction and hence upheld the principle of the action of like on like, and another in which Theophrastus scented interaction but Anaxagoras did not. So Plato distinctly lays down the principle that ποιεῖν and πάσχειν take place only between opposites, but does not apply it to τροφή. One must study individual problems and not draw inferences from the principles supposed to be operative in one sphere to another, unless one has evidence that they were seen by the thinker in question to be related. I was in this respect myself at fault at a few points in *Qualitative Change*.

⁵ Cf. Philoponus, *de Anima*, 282, 9 f., Hayduck.

⁶ Hipp. II. τροφῆς, I (9, 98 L.). The classification of nutrients as 'meat and drink' constantly recurs.

⁷ Theophr. *C. P.* 6, I, I.

everywhere the basis of nutriment: only in certain animals does it take on the form of blood, and blood is a mixture of water and earthy substances.¹ Blood and semen also have an admixture of air,² and all blood is warm; hence we may regard blood as a compound of all the elements.³ Stated in this form the conception meets us first, perhaps, in Aristotle; but one who reads Greek philosophical literature will quickly convince himself that the theory is based in all its parts upon the common notions of the people.

That water, as the vehicle of nutriment, was regarded as a mixture is quite evident, and was supported by the observation of springs which have varying tastes. Their waters differ according to the character of the soil through which they percolate.⁴ It was supported also by the observation of differences to be noted in the juices of fruits and the sap of plants. Whence did these variations arise? From the common soil, which must, therefore, contain all kinds of properties. But there were growths so exceptional that not every soil could provide the necessary ingredients;⁵ and even where this was not the case, it was known that wines differed in flavor and excellence not so much from differences of vines as from varieties of soil and exposure.⁶ An organism is modified by what it feeds on. These are all homely observations, which imply no philosophy and are clearly the primitive conceptions of the common man. Occasionally we meet a piece of unmistakable folk-lore, as when

¹ Arist. *de Part. animal.* 668b 9 f. Cf. Emped., fr. 98.

² Arist. *Meteor.* 389a 19.

³ Theophr. *de Sensu*, 10 (Diels, *Dox.* 502, 13 f.) finds the reason for Empedocles's identification of mind with the blood in the fact that blood is the most mixed of substances. There is much to be said for this view, but it cannot be further discussed here: it is connected with the large subject of *συνπάθεια*, which I hope to treat at another time. Yet, since like is nourished by like and the blood is the vehicle of nutrients in animals, it must contain all the substances that are to feed the several parts of the body.

⁴ Arist. *de Sensu*, 441b 1 f.

⁵ Hipp. II. *νοῦσων*, 4, 34 (7, 546 L.) cites the instance of *σέλφιον*, which could not be grown in Ionia or the Peloponnesus, but grew spontaneously in Libya.

⁶ See Empedocles, Aët. 5, 26, 4 (Diels, *Dox.* 439, 14 f.). The text is improved in Diels, *Vorsokr.*², I, p. 164, 19 f. Cf. Hipp. II. *παθῶν*, 60 (6, 268 L.), and Theophr. *C. P.* 4, 10 f.

Pausanias¹ tells of the serpents on Helicon whose virus was made comparatively harmless by the herbs they fed on.

If these considerations provide the means of explaining the variations, we must look elsewhere for the principle of uniformity. The permanence of the species is too obvious a fact to escape even the primitive man: for man does not spring from oak or rock. 'Man begets man,' in Aristotle's stock phrase, is the foundation of all sober thinking; and this thought is not due to philosophy. But the determination of antecedents applies not only to the origination of the individual, but also to his maintenance. One cannot dissociate generation (γένεσις) from nutrition (τροφή), and countless tokens prove that even the primitive Greek did not fail to note the connection. Nutrition serves the ends of growth and repair; but growth and repair alike involve the principle of the accession of like to like. When one grows the organism as a whole retains its identity, but increases in bulk: there is more of the same kind of substance. When waste is repaired it is replaced by its like. Hence we have the organism in its various parts and with its constituent substances to begin with. Later authors speak of this regulative principle as the 'faculty' (δύναμις) of nutrition: Aristotle calls it by preference the 'nutritive soul.' The thought is well expressed in Hippocrates, *Περὶ διαίτης*²: 'Each soul goes its way, possessing more or less organs, requiring neither addition nor subtraction of organs, but demanding more or less room according to the growth or decrease of that which it possesses, and produces the individuals into which it enters and receives what comes to it. But since³

¹ 9, 28. Pausanias there speaks also of the vipers of Phoenicia and Arabia. The former are rendered more venomous by the roots which they eat; the latter, feeding on the perfumes of the balsam-trees, have a mild and less deadly venom. For this bit of folklore, attested by Hom. *Il.* 10, 93 f., see Roscher, *Die Entstehung des Gift-honigs und des Schlangengiftes nach antikem Volksglauben*, *N. Jhrb. für cl. Philol.*, CLI (1895), pp. 329-332.

² 1, 6 f. (6, 478 f. L.). I render the improved text given by Diels, *Herakleitos von Ephesos*², p. 56 f., except where changes are noted. Diels has just published additional critical notes on the text in his *Hippokratische Forschungen* II, in *Hermes*, XLVI (1911), p. 267 f.

³ Diels did not see, what seems obvious, that οὐ γὰρ δύναται does not connect with the preceding, but looks forward to the following clause; it is an instance of the proleptic use of γὰρ so common in Homer and Herodotus (cf. Kühner-Gerth, *Gr. Grammatik*, § 545, 4). We must replace the period after ἐμμένειν with a comma, and cancel the following γὰρ.

the alien cannot abide in an unfavorable place the unfamiliar¹ goes astray, but those particles which are familiar to one another recognize that with which they settle down: for the congenial settle down with the congenial, but the uncongenial war and fight and separate one from the other. For this reason the soul of a man grows in a man and in nothing else. It is the same with all other large animals: those which part from one another are segregated by violence. I will dismiss the question concerning the other animals and set forth my view touching man. Into man there enters a soul, containing a mixture of fire and water, the constituents of man's body.² It must possess all the constituents that are to enter the body; for if any part were absent in the beginning, it could not grow whether much nutriment entered or little, as it does not have that which is to increase. But if it possesses all the constituents, each grows in its appropriate place when nourishment is added from dry water and moist fire, and forces some constituents (of the food) inwards and others outwards.'

We thus see the nutritive soul in operation effecting a separation of the available constituents of the things taken as food from the unavailable, which are eliminated. We discover also that the principle of selection is the old one of the birds of a feather that flock together and drive off all that are not of their kind. The attraction of like for like is the force at work. 'In all meat and drink³ there is something bilious, aqueous, sanguineous,⁴ and phlegmatic, here more, there less, wherefore things taken as meat and drink differ in wholesomeness. . . . When a man eats or drinks, the body attracts from the abdomen the aforesaid humor, and the vital organs⁵ attract from the abdomen through the

¹ Or, 'unrecognized,' if we read ἀγνοούμενα, with Θ².

² Here there follows the sentence: ταῦτα δὲ καὶ θήλεα καὶ ἄρσενα [καὶ] πολλὰ καὶ παντοῖα τρέφεται τε καὶ αὖξεται διαίτη τῇ περ ἀνθρώπου. If it is not, as I incline to think, a scholion, the passage is at least misplaced; for it relates to the other animals which the writer proposes to pass over in silence. If it is retained, it should be inserted after either ἐάσω or δηλώσω.

³ Hipp. II. νούσων, 4, 33 (7, 544 L.).

⁴ Arist. *Phys.* 188^a 2 f.: ἔτι δ' (according to Anaxagoras) ἐν τοῖς ἀπείροις σώμασιν ἐνυπάρχει ἀν' ἣδη σὰρξ ἀπειρος καὶ αἷμα καὶ ἐγκέφαλος, κτλ.

⁵ They are here called πηγαί; elsewhere, e. g., II. φύσεων, 7 (6, 100 L.), πηγαὶ καὶ ῥίται, or again, e. g., II. τροφῆς, 31 (9, 110 L.), ῥιζώσεις. These names are interesting in connection with II. φύσεων, 1 (6, 92 L.): τίς ἀρχὴ καὶ πηγὴ γίνεται

veins the humors, each humor attracting its like, and distribute them to the body, just as in the case of plants each humor draws its like from the earth. For the earth contains within itself qualities in countless variety. To all the plants that grow in it, it furnishes its like to each, even as each thing that grows has a humor like unto itself after its kind, and each draws from the earth nourishment like unto itself;¹ for the rose draws from the earth a humor like in quality to itself, and garlic draws from the earth a humor like in quality to itself, and all other plants in like manner. Were it not so, plants would not be like their seeds' (that is, they would not be true to type). These same notions are expressed at length in Hippocrates's *Περὶ φύσιος παιδίου*,² with special application to the human embryo. No doubt it will be said that in these writings the influence of Empedocles is manifest; and this may perhaps be granted, although a certain resemblance at a few points,

τῶν ἐν τῷ σώματι κακῶν; εἰ γὰρ τις εἰδὲν τὴν αἰτίαν τοῦ νοσήματος, οἷός τ' ἂν εἴη προσφέρειν τὰ ξυμφέροντα τῷ σώματι, ἐκ τῶν ἐναντίων ἐπιστάμενος [from ἐφίσταμαι, 'bringing up'; cf. II. φύσιος ἀνθρώπου, 9 (6, 52 L.)] τὰ βοηθήματα. Here the ἀρχὴ καὶ πηγὴ is the αἰτία. Cf. also Arist. *Meteor.* 353^a 34: οἱ μὲν οὖν ἀρχαῖοι καὶ διατρίβοντες περὶ τὰς θεολογίας (e.g., Hes. *Theog.* 727 f.) ποιοῦσιν αὐτῆς (sc. θαλάττης) πηγάς, ἔν' αὐτοῖς ὧσιν ἀρχαὶ καὶ ῥίζαι γῆς καὶ θαλάττης. In view of this it is difficult to accept the dictum of Burnet, *Early Gr. Philosophy*², p. 14: 'To Anaximander ἀρχή could only have meant "beginning," and it was far more than a beginning that the early cosmologists were looking for: it was the *eternal* ground of all things.' See also my *Περὶ Φύσεως in Proceedings Amer. Acad. of Arts and Sciences*, XLV, p. 79, n. 3, and cf. Hipp. II. τροφῆς, 24 (9, 106 L.). Empedocles called his elements ῥιζώματα, and, according to Diels, Anonym. Londin. 6, 18 f., Hippocrates taught: δίκην τε ἐπέχειν ἡμᾶς φυτῶν· ὥς γὰρ ἐκεῖνα προσερρίζωται τῇ γῇ, οὕτως καὶ αὐτοὶ προσερρίζωμεθα πρὸς τὸν ἀέρα κατὰ τε τὰς ῥίνας καὶ κατὰ τὰ ὅλα σώματα. We have no text corresponding exactly to this, but in spirit it accords with II. φυσέων. Xenophanes is said to have spoken of the earth as ἐπ' ἀπειρον ἔρριζωμένη, which Empedocles apparently understood as implying that the earth extended downward to infinity. May Xenophanes have alluded to cosmic respiration in this connection? According to a recently discovered statement in the Scholia to St. Basil (cf. Pasquali, *Doxographica aus Basiliusscholien*, in *Götting. Nachr.*, *Philol.-hist. Kl.*, 1910, pp. 201, 203 f.): Παρμενίδης ἐν τῇ στιχοποιᾷ ὑδατορίζον εἶπεν τὴν γῆν. The scholiast cites this to illustrate the statement that the earth rests on water; but was that necessarily the meaning?

¹ Cf. Hipp. II. φύσιος ἀνθρώπου, 6 (6, 44 f. L.), on the action of emetics.

² C. 22 (7, 514 L.); 23 (7, 516 L.); 17 (7, 496 f. L.); cf. II. σαρκῶν, 13 (8, 600 L.).

coupled with a degree of independence which is not commonly found in an inferior disciple of a great master, hardly constitutes a proof. In the Iatrosophistae represented in the Corpus Hippocrateum we are confronted with one of the most difficult problems of ancient literature and thought. It is easy to dispose of them as imitators of Heraclitus, as in *Περὶ διαίτης* and *Περὶ τροφῆς*, or of Empedocles, as in *Περὶ φύσιος παιδίου*, *Περὶ φύσεως*, *Περὶ νούσων*, IV, etc.; but if we regard them merely in that light we shall do them injustice and fail to profit by the suggestions they give of the common store of intelligent thought of their time, which was, no doubt, in certain particulars, chiefly in matters pertaining to theory, influenced by the popular systems of philosophy, but nevertheless must have reflected for the most part the general thought of the time. The originality of these writers is not great; but the freedom with which they treat their subjects shows that they did their own thinking. And the very reasons which excuse Plato and Aristotle from taking particular account of them, constitute their best claim to our attention. Aristotle,¹ in taking stock of the philosophical opinions relative to the problems of generation and decay, says: 'Nobody, as I have said, has discussed the principles of growth, except as the first man you meet in the street might express it, that things grow by the accession of like to like; but they do not go farther and explain the method.' He clearly regarded the opinion he so lightly cashiered as a popular notion which merited no further remark.

It would hardly be just to Aristotle's predecessors, however, to conclude that they had not presented a fairly complete view of nutrition. We have seen that each plant was supposed to draw from the earth a humor like unto itself, and that it therefore remained true to its specific type. But this was too general and required to be applied to the several parts of the plant and to the organs of the body. The humor taken in by the organism was not simple, but was a complex composite, containing within itself the constituents appropriate to the particular parts.²

¹ *De Gen. et Corr.*, 315^b 1 f.

² Aët. 5, 27, 1 (Diels, *Dox.* 440): 'Ἐμπεδοκλῆς τρέφεσθαι μὲν τὰ ζῷα διὰ τὴν ὑπόστασιν τοῦ οἰκείου (so the MSS., 'by the depositing of the appropriate,' which in this case can mean—as indeed τὸ οἰκεῖον always meant in nutrition—only 'the like'; Diels, probably taking ὑπόστασιν in the sense of 'sediment,' unnecessarily changes οἰκεῖον to ὑγροῦ), αὔξεσθαι δὲ διὰ τὴν παρουσίαν τοῦ θερμοῦ, μειοῦσθαι δὲ καὶ φθίνειν διὰ τὴν ἔκλειψιν ἐκατέρων.

Nourishment, passing through the vascular system of veins and minor ducts was likened to irrigation;¹ and since the blood is in the higher animals the vehicle of nutriment, it is particularly charged with this function.² It is perhaps significant of the wide currency of this view that when Aristotle³ discusses at length the theory of savor, he states only two theories beside his own. The first is attributed to Empedocles, and supposes 'that water contains in itself the various kinds of savor, already formed, though in amounts so small as to be imperceptible.'⁴ Aristotle does not name the author of the second opinion, but Alexander rightly attributes it to Democritus.⁵ It is stated thus: 'The water must be a sort of matter, qualified, as it were, to produce germs of savor of all kinds, so that all kinds of savor are generated from the water, though different kinds from its different parts.' The third possible view, which is that of Aristotle himself, is then put forward: 'The water is in itself quite undifferentiated in respect of savor, but some agent, such as one might conceive Heat or the Sun to be, is the efficient cause of savor.'

Of Aristotle's own theory we need not speak, since it plainly bears the distinctive character of his favorite conception of a qualitative change (*ἀλλοίωσις*) wrought by some cause in a matter that is opposite or neutral in quality. The theory of Democritus we may dismiss briefly, since it is clearly a metaphysical development of the view attributed to

¹ Hipp. Π. *σάρκων*, 13 (8, 600 L.): ἡ δὲ τροφή ἐπειδὴν ἀφίκεται ἐς ἕκαστον, τοιαύτην ἀπέδωκε εἰδέην ἐκάστου ὁκοῖα περ ἦν (this must mean, 'maintains by what it deposits the character of the several organs such as it was'; but one might have expected *ἰδέην ἐκάστῳ ὁκοῖόν περ ἦν*, 'gave to each organ a nutriment like that of which it was constituted'). ἀρδόμενα γὰρ ὑπὸ τῆς τροφῆς αὖξεται ἕκαστα. Cf. Plat. *Tim.* 78 E, 81 D; *Athen.* 2, 18 (43): καὶ ἡμῶν δὲ πᾶσα δύναμις ἐξ ὑδάτων ἀρδεται. The peculiar properties of various waters are here illustrated at some length.

² Theophr. *de Sensu*, 24, speaks of τὴν ἐν τοῖς μορίοις τοῦ αἵματος σύγκρασιν as, according to Empedocles, the explanation of the specialization of functions in the organs of the body. Arist. *de Respirat.* 474^b 3: ἡ τροφή μὲν γὰρ ἐξ ἧς ἤδη γίνε-ται τὰ μόρια τοῖς ζώοις, ἡ τοῦ αἵματος φύσις ἐστίν. This doctrine did not originate with him. Cf. Hipp. *Γυναικείων*, 1, 25 (8, 64 L.): κατέρχεται γάρ, ἐπὶ ἡν ἐν γαστρὶ ἔχῃ ἡ γυνή, ἀπὸ παντὸς τοῦ σώματος αἷμα ἐπὶ τὰς μήτρας κατ' ὀλίγον, καὶ περιεσ-ταμένον κύκλῳ περὶ τὸ ἐν τῇσιν μήτρῃσιν ἔον αὖξει κείνο.

³ *De Sensu*, 4.

⁴ Cf. Alexander, *ad. loc.* 68, 25 and 67, 19 f.

⁵ The theory cannot be that of Anaxagoras, as Hammond suggested.

Empedocles. Instead of real savors, actually carried in solution in the water, we obviously have the atoms which are qualitatively homogeneous or neutral, but possess the power or capacity¹ to produce qualitative distinctions through combination,² by reason of the varying shapes of the atoms. We need scarcely remark that the Atomists, in obedience to metaphysical and epistemological considerations, offer us only a refined method of smuggling in by a back door what they expelled with much ceremony at the front. As to the first theory, we are not to suppose that it belonged only to Empedocles, or that it was necessarily from him that the Atomists borrowed the conception on which they based their futile refinement. Aristotle himself would set us right, for he says³: 'Now the sapid juices found in pericarpal fruits evidently exist also in the earth. Hence many of the old natural philosophers assert that water has qualities like those of the earth through which it flows, a fact especially manifest in the case of saline springs, for salt is a form of earth. Hence also when liquids are filtered through ashes, a bitter substance, the taste they yield is bitter. There are many wells, too, of which some are bitter, others acid, while others exhibit other tastes of all kinds.'⁴

There remains one further point to note in connection with the mechanism of nutrition. We have seen that growth is explained on the principle of the accession of like to like, and that this addition is brought about as a result of the attraction of like for like. We have now to ask whether there was any attempt to account for this attraction. The answer is simple. It was due to the 'drawing' upward of the humors by the sun; for in all water there is heat, and this heat tends upward or sunward, thus causing the branches of the plant, in which the heat predominates, to grow in that direction, whereas the roots, in which the earthy elements prevail, tend downward by the affinity of like

¹ In the vague interval between the fixed form of the atoms and the kaleidoscopic changes they may produce by combination and arrangement much mystery could lie concealed. It was here that Aristotle found the only real point of departure among the pre-Socratics for his conception of potentiality (*δύναμις*, *δυνάμει ὄν*).

² Cf. Alexander, *ad loc.* 68, 5 f., especially 18 f. and 23 f.

³ *De Sensu*, 441^a 30 f. Cf. p. 152, n. 1, above.

⁴ Cf. *Plut. Act. Phys.* B, 912 B f.

for like.¹ The subject of attraction, although involved in our present discussion, lies somewhat aside from the main purpose of this study, and must be reserved for detailed consideration at another time.

The conception of nutrition which we have sketched must have taken shape in the medical schools, though based on homely observations of common men who viewed the world not through hazy metaphysical formulas but with the concreteness of the unsophisticated. The exigencies of prescribing diet and medicines inevitably led to a certain rationale to guide the physician in the choice of means to his end. The uniform principle which thus emerged was that like attracts like and like feeds like. It may be objected that ancient medicine generally proceeded on the allopathic principle, *contraria contrariis*;² but this, as we shall see, is not a negative instance, but an application of the dictum *ὁμοιον ὁμοίῳ*. For our purposes we may confine ourselves to the Corpus Hippocrateum, since it alone concerns us here. First we must assume the point of view of the physician. Just as there is in the cosmos a warfare of the elements, so is there also in the body of man.

¹ Aët. 5, 26, 4 (Diels, *Dox.* 439): (According to Empedocles, plants) αὔξεσθαι δὲ ὑπὸ τοῦ ἐν τῇ γῇ θερμοῦ διαιρόμενα ('in altum elatas,' Diels), ὥστε (restrictive, 'without ceasing to be') γῆς εἶναι μέρη καθάπερ καὶ τὰ ἔμβρυα τὰ ἐν τῇ γαστρὶ τῆς μήτρας μέρη· τοὺς δὲ καρποὺς περιττώματα εἶναι τοῦ ἐν τοῖς φυτοῖς ὕδατος καὶ πυρός. The best commentary on this report is Hipp. II. φύσιος παιδίου, 22 (7, 514 f. L.); cf. particularly καὶ <τὸ σπέρμα> βιώμενον ὑπὸ τῶν φύλλων (the cotyledons) μεθίησι τῆς δυνάμειος (quality or qualitative ingredient) ἐς τὸ κάτω, ἣ ἐν αὐτῷ ὑπολείπεται (after the sun's heat has evaporated the lighter ingredients) διὰ τὴν βαρύτητα, and (p. 516) τὸ δὴ θερμαίνόμενον ὑπὸ τοῦ ἡλίου ἐκξέει ἐς τὰ ἄκρα. The entire account starts from the discussion of the foetus. Since Empedocles was a physician it is possible that the general comparison was part of the medical tradition.

² Hipp. Ἀφορισμοί, 2, 22 (4, 476 L.): ἀπὸ πλησμονῆς ὀκόσα ἂν νοσήματα γένηται, κένωσις ἰῆται, καὶ ὀκόσα ἀπὸ κενώσιος, πλησμονή, καὶ τῶν ἄλλων ἢ ὑπεναντίωσις. Ἐπιδημ. 6, 5, 4 (5, 316 L.): ἴησις ἀντίνοον, μὴ ὁμονοεῖν τῷ πάθει. II. φύσιος ἀνθρώπου, 9 (6, 52 L.). II. φυσέων, 1 (6, 92 L.) see the passage quoted above, p. 149, n. 5, and: ἐνὶ δὲ συντόμῳ λόγῳ, τὰ ἐναντία τῶν ἐναντίων ἐστὶν ἰήματα· ἰητρικὴ γάρ ἐστι πρόσθεσις καὶ ἀφαίρεσις, ἀφαίρεσις μὲν τῶν ὑπερβαλλόντων, πρόσθεσις δὲ τῶν ἐλλειπόντων· ὁ δὲ τοῦτ' ἀριστα ποιεῶν ἀριστος ἰητρός. II. τόπων τῶν κατὰ ἀνθρώπον, 41 (6, 332 L.). II. ἱερῆς νούσου, 18 (6, 394 f. L.): χρὴ δὲ καὶ ἐν ταύτῃ τῇ νούσῳ καὶ ἐν τῇσιν ἀλλαγῇσιν ἀπάσῃσι μὴ αὔξειν τὰ νοσήματα, ἀλλὰ σπεύδειν τρύχειν προσφέροντα τῇ νούσῳ τὸ πολεμιώτατον ἐκάστη, καὶ μὴ τὸ φίλον καὶ σύννηθες· ὑπὸ μὲν γὰρ τῆς συνηθείης θάλλει καὶ αὔξεται, ὑπὸ δὲ τοῦ πολεμίου φθίνει καὶ ἀμυνοῦται.

Health consists in the harmony or proper ratio of one element with another; disease is due to the disturbance of the balance, when one element overpowers another. Hence the physician is called in to restore harmony, which he accomplishes by going to the succor (*βοηθεῖν*) of the element that is in danger of succumbing. This he can do either directly, by feeding or strengthening the weaker combatant, or indirectly, by breaking the force of the stronger. As the character of the disease is determined by the extravagating element, either procedure may fitly be described as curing opposites by opposites. Strictly the action of medicine is the same as that of food. 'For¹ just as plants and seeds, when put into the earth, draw each that constituent present in the earth which is after its kind (and there are present there the acid, the bitter, the sweet, the saline, and every sort); first, then, each draws to itself that which is most after its kind, and thereafter also others: even so also do medicines act in the body.' This view is therefore quite consistent with the theory of nutrition as stated above.

There is, however, one statement which is not so easily disposed of, although it rests ultimately on the same principles. Hippocrates *Περὶ τρόπων τῶν κατὰ ἄνθρωπον*,² develops the thought that disease and cure are equally produced by the giving of like or of the unlike, according to circumstances (*καιρός*). In the last resort all depends on the relation between the body and that which is administered to it. When food is given in right quantities the body is nourished in right measure, and masters the food; if too little or too much is given or otherwise violent changes occur in the diet,³ the food overmasters the body, and then fever sets in and the selfsame foods produce an effect opposite to that which is normal. Although it is impossible, because of the corrupt condition of the text, to determine the writer's thought in all particulars, the general drift of the argument is clear; and it is evident that the same principles are supposed to obtain in both cases, though the changed conditions cause the same substances to act differently on the body.

¹ Hipp. II. *φύσιος ἀνθρώπου*, 6 (6, 44 L.).

² 42-44 (6, 334 f. L.).

³ The clause *ἢ ἀλλοίως μεταλλάξας κρατέηται* in c. 43 is clearly corrupt; but it is impossible to emend it satisfactorily with our present means. For this, as for many other points in the text of Hippocrates, we must await the promised *Corpus Medicorum Graecorum*.

There is furthermore involved the old Greek conception of change effected by a disturbance of the balance of power (ἐπικράτεια). For when an element oversteps its limit it is lost, as in the tug of war; or, as Lucretius says, repaying Heraclitus in his own coin, 'whenever a thing changes and quits its proper limits, at once this change of state is the death of that which was before.'¹

The foregoing account of the process of nutrition shows conclusively that the principles were not laid down by any individual but were developed from popular conceptions by various thinkers who belonged to the long and honorable line of the medical tradition. We know a few, but evidently relatively few, names of individuals, and are enabled by the scanty ancient sources to assign to Alcmaeon and Empedocles² a few specific doctrines; but are we thereby justified in regarding them as the 'discoverers' or originators of these principles? Even if we possessed unimpaired the rich store of literature dating from the sixth and fifth centuries, which we know to have existed, we should still be liable to error; for we know that nothing is more difficult than to determine the source of widely current thoughts. The search for beginnings and 'inventions,' which flourished in the Alexandrine age, yielded the scattered data on which we are largely dependent; yet even with our limited means we can prove that large masses of literature were hardly examined³ with a view to discover what they might yield.

¹ I, 670 f., transl. Munro.

² It appears to be generally overlooked that Empedocles was himself a physician. A study of the fragments of his poems and of the various traditions regarding him would of itself lead us to class him as such. Even his *Καθαρμολ* point to the same conclusion: cf. Hipp. II. *ἱερῆς νούσου*, I (6, 354 f. L.). But we have the express testimony of Satyrus (Diog. L. 8, 58) that he was a physician. He was probably the first of the notable *ιατροσοφισταί*. This would help to explain his relation to the older medical tradition, on the one hand, and to the Sicilian school of physicians and the later *ιατροσοφισταί*, on the other. Cf. Zeller, *Philosophie der Gr.* Ib, p. 754, n.

³ Galen, *Comment. ad I. Hipp. de Nat. hom.* (15, 25 f. K.), speaking of Menon's *Iatrika*, says: τῶν δ' ἤδη διαφθαρμένων παντάπασιν, ἣ σφισμένων μὲν, οὐ θεωρηθέντων δ' αὐτῷ, τὰς γνώμας οὐκ ἠδύνατο γράψαι. [Diels, *Sitzungsberichte der Akad. der Wiss. zu Berlin*, 1893, I, p. 103, n. 1, proposed *γνωρισθέντων* for *θεωρηθέντων*; but the text is sound. It means 'mustered' or 'passed in review.'] If Menon disregarded much, it is clear that for us it is irretrievably lost, as Galen and our other sources were absolutely dependent upon him for the older medici except 'Hippocrates.'

In this respect the medical writers appear to have fared even worse than others, since it is probable that in the fourth century no one knew what Hippocrates had written. The works now current under his name were clearly for the most part *adespota*.

What we know of the philosophy of Anaxagoras leads us to regard him as a link in the chain we have been tracing. Aristotle, in a puzzling passage,¹ discusses the doctrine of Anaxagoras in conjunction with Anaximander and Empedocles, relating it to 'the universal dogma of the physiologers,' *e nihilo nil fit*. Consequently 'they thought that things must arise from elements pre-existing and actually present in that from which they spring, but imperceptible by reason of the minuteness of the particles.'² And they therefore said that everything entered into the composition of everything, because they saw everything springing from everything; but that things differed in appearance and went by different names, according to the ingredient which predominated³ in quantity in the mixture of infinite constituents. Nothing existed, they thought, absolutely and altogether⁴ white or black or sweet or flesh or bone, but that of which it had most, gave character to the thing.' Whether this statement was framed, as seems highly probable, to include Empedocles, and possibly Anaximander, it certainly does state in its main outlines the thought of Anaxagoras, and emphasizes the logical or metaphysical principle which constituted it a philosophy. But it was clearly a more concrete body of facts that suggested the doctrine, and we are able to determine with a high degree of certainty what those facts were. They were the familiar phenomena of nutrition and generation⁵ as interpreted by the thought of the time.

¹ *Phys.* I, 4. I cannot here discuss the questions which grow out of the grouping of Anaximander, Anaxagoras, and Empedocles together in a common statement. Certain phrases evidently include the Atomists as well.

² Cf. Anaxagoras, fr. I Diels; Hipp. II. *ἀρχαίης ἰητρικῆς*, 14 (I, 602 L.): *ἐν γὰρ ἀνθρώπῳ καὶ πικρὸν καὶ ἀλμυρὸν καὶ γλυκὺ καὶ ὀξὺ καὶ στρυφνὸν καὶ πλαδαρὸν καὶ ἄλλα μυρία παντοίας δυνάμειας ἔχοντα, πλήθος τε καὶ ἰσχύς. ταῦτα μὲν μεμιγμένα καὶ κεκρημένα ἀλλήλοισιν οὔτε φανερά ἐστιν, οὔτε λυπέει τὸν ἀνθρώπον· ὅταν δέ τι τουτέων ἀποκριθῇ (is segregated) καὶ αὐτὸ ἐφ' ἐωυτοῦ γένηται, τότε καὶ φανερόν ἐστι καὶ λυπέει τὸν ἀνθρώπον.*

³ Cf. Anaxagoras, fr. 12 Diels.

⁴ Cf. Anaxagoras, fr. 8 Diels.

⁵ See Anaxagoras, fr. 10 Diels, and Burnet, *Early Gr. Philosophy*², p. 303 f. Lucr. I, 881 f. offers the fullest statement.

There are certain points on which it is perhaps impossible to determine the precise thought of Anaxagoras ; but there can be no doubt that at the root of his system lies the primitive conception of qualities as concrete ingredients, actually present in the thing and by their accession or departure changing its character. The ingredients, imparted by the earth, which spring-water contains and to which it owes its taste and its wholesome or unwholesome action on the system ; the nutriment carried by the blood and deposited as 'flesh added to flesh'¹; and the seed, containing in a nut-shell, as we say, all that shall spring from it, and guaranteeing the permanence of the species and the similarity of offspring to parent, because it is in the most literal sense an *abstract* (ἀπόσπασμα) of the parent, being 'of his flesh and of his bones'; these are, indeed, as Gomperz says,² data of primitive man's conception of nature, and they explain the thought of Anaxagoras. It is not improbable that Empedocles shared the same view, referring chiefly to the properties of the elements when he said that fire, air, water, and earth constituted things ; for he was clearly so interpreted by Philistion and others of the Sicilian school of medicine,³ and the criticism of the supposed 'elements anterior to the elements' which Aristotle offers in *De Caelo*⁴ seems to presuppose this view. The difference between Empedocles and Anaxagoras thus lies essentially in the fact that the former postulated four qualities whereas the latter did not limit the number.⁵

Of the Atomists there is little need to speak. The 'seeds' of Anaxagoras were seeds also to them. It was the same demand to discover the end in the beginning, and the beginning in the end, that gave rise to both theories ; but whereas Anaxagoras naively saw the thing itself in the seeds, Democritus and Epicurus found there only its determining

¹ Arist. *de Gen. animal.*, 723^a 10: 'Ἀναξαγόρας μὲν γὰρ εὐλόγως φησὶ σάρκας ἐκ τῆς τροφῆς προσιέναι ταῖς σαρκί.'.

² *Griechische Denker*¹, I, p. 180: 'Damit war Anaxagoras zu der naiven Natur-auffassung des primitiven Menschen zurückgekehrt,' etc. Gomperz regards this as a serious indictment; but that does not concern us here.

³ Diels, Anonym. *Londin.* 20, 25: Φιλιστιῶν δ' οἶεται ἐκ τῶν ἰδεῶν συνεστάναι ἡμᾶς, τοῦτ' ἔστιν ἐκ τῶν στοιχείων· πυρὸς, ἀέρος, ὕδατος, γῆς. εἶναι δὲ καὶ ἐκάστου δυνάμεις, τοῦ μὲν πυρὸς τὸ θερμόν, τοῦ δὲ ἀέρος τὸ ψυχρόν, τοῦ δὲ ὕδατος τὸ ὑγρόν, τῆς δὲ γῆς τὸ ξηρόν. Cf. Wellmann, *Fr. der gr. Ärzte*, I, p. 69 f.

⁴ 3, 5, esp. 304^b 6 f.

⁵ See Zeller, *op. cit.* Ib, p. 980, n. 2.

cause. The account of Lucretius, which truthfully reproduces the thought of Democritus as well as of Epicurus, requires only the substitution of definite, qualitatively determined granules for the atoms, qualitatively homogeneous or indifferent, but determinate in size and shape, in order to apply with equal propriety to the theories of Empedocles and Anaxagoras.¹ And it is evident that the Roman poet was aware of the fact.

We have thus far considered the subject of nutrition only in its most general aspects; but Greek science was not content to leave the matter there. There can be no doubt that from the earliest times men, and particularly physicians, were aware of the principal stages of the process, such as the mastication of food by grinding between the molars, deglutition, distribution, and elimination; but it was not known just what took place in the stomach and the intestines, except that somehow the food was there prepared to perform the ultimate purposes of nutrition, the repairing of waste and the growth of the organism. Doubtless it was early known that animal heat was conducive to the successful disposal of nutriment, since in the absence of it the food remained to disturb the system.² The general view, which we have found so widely held, appeared to call for nothing more, and it is evident in particular that there was no special theory of 'digestion.'

It was probably Aristotle who first singled out digestion (*πέψις*) as a subject for special treatment. Others before him had, as we shall presently see, referred vaguely to foods as digested or undigested, but

¹ Lucr. I, 159-214. The argument, if accepted at its face value, presupposes the postulate of specific antecedents, virtually like those assumed by Empedocles or Anaxagoras. What Lucretius wishes to establish is the existence of atoms of specific shapes, which merely alters the form, not the substance, of the thought: cf. 190 f.: *ut noscere possis | quidque sua de materia grandescere alique*. Only at v. 196 does a hint of distinctively atomistic thought occur. The same observation holds true of I, 803-829 and I, 865-920. The latter passage in particular shows that Lucretius was aware of the essential similarity of the doctrines of Epicurus (Democritus) and Anaxagoras. The parallel is perfect, except for the points noted. Lucr. I, 167 uses *genitalia corpora* in reference to the atoms; Ovid. *Met.* 15, 239, of the four elements: *quattuor aeternus genitalia corpora mundus | continet*. Everywhere we meet the *semina certa*, only in the Atomists the idea has lost its original force, which survives intact in the other corpuscular systems. Cf. also Lucr. 2, 546-568; 2, 865 f., 1156 f., and Giussani, *Lucreti Cari De R. N.*, II, p. 143 f.

² Hipp. *Ἀφορισμοί*, I, 14 (4, 466 L.); II. *διατρῆς ὑγιαυνῆς*, 7 (6, 82 L.); II. *φυσέων*, 7 f. (6, 98 f. L.); II. *διατρῆς*, 3, 75 (6, 616 L.); II. *νούσων*, 42 (7, 562 f. L.). Cf. p. 151, n. 2 above, and Diels, *Anonym. Londin.* 5, 37 f.

no one had inquired narrowly into the implications of the conception. Previous opinion had been based upon simple observations and on the primitive notions of practical men: when, as in the case of Empedocles and Anaxagoras, logical or metaphysical principles were applied, they were of the simplest kind, like that of *e nihilo nil fit*, which were begotten of the same primitive notions. The Atomists alone had carried the question beyond this range of ideas, in that they substituted general causality for the specific antecedents in kind, thus interpolating a vague metaphysical term between the antecedent and the consequent. While Aristotle did not accept Atomism, he did seize the opportunity presented by this breach, and installed there two kindred conceptions, which are in fact the most characteristic ideas of his system: to wit, (*a*) the change of quality (*ἀλλοίωσις*) which occurs without addition to or subtraction from the material substratum, being a change from a qualitatively indifferent into a qualitatively determinate or from contrary to contrary, and (*b*) the development from a state of potentiality to a state of actuality.¹ This almost inseparable pair of conceptions he applied to digestion,² and accordingly distinguished food before digestion, which he regarded as 'opposite' in character to the organism, from digested food, that had become 'assimilated' to the organism in the process of digestion by the operation of the internal heat of the body.⁴ 'Heat causes growth,⁵ and fits the food-stuff for alimentation; it attracts [into the organic system] that which is light [viz. the sweet],⁶

¹ See above, p. 153, n. 1.

² *De Anima*, 416^b 3 f. The whole chapter should be consulted. See also *Meteor.* 379^b 18-380^a 6.

³ Aristotle himself does not use *ἐξομοιοῦσθαι*, which subsequently became the technical term for the process; nor does he expressly apply the term *ἀλλοίωσις* to it, although he clearly indicates the conceptions in both cases. Thus Galen, 15, 237 K, says: *ὁμολόγηται γὰρ . . . τὴν πέψιν εἶναι ἀλλοίωσιν καὶ μεταβολὴν τοῦ τρέφοντος εἰς τὴν οἰκείαν τοῦ τρεφομένου ποιότητα*, and [Arist.] *Problem.* 907^a 18: *ἡ γὰρ πέψις ἀλλοίωσις ἐστὶ τοῦ πεπτομένου*.

⁴ *De Anima*, 416^b 27 f.; *Meteor.* 379^a 18: *πέψις μὲν οὖν ἐστὶ τελείωσις ὑπὸ τοῦ φυσικοῦ καὶ οἰκείου θερμοῦ ἐκ τῶν ἀντικειμένων παθητικῶν κτέ.* Cf. also *de Gen. animal.* 753^a 19; 765^b 15; 786^a 17; *de Part. animal.* 650^a 3: *ἐπεὶ δ' ἀνάγκη πᾶν τὸ αὐξανόμενον λαμβάνειν τροφήν, ἡ δὲ τροφή πᾶσιν ἐξ ὕγρου καὶ ξηροῦ, καὶ τούτων ἡ πέψις γίνεταί καὶ ἡ μεταβολὴ διὰ τῆς θερμοῦ δυνάμεως, κτέ.*

⁵ *De Sensu*, 442^a 4 f., transl. Beare.

⁶ Note the exact parallel to the cosmic process of *ἀναθυμίασις*.

while the salt and bitter it rejects because of their heaviness. In fact, whatever effects external heat produces in external bodies, the same are produced [by their internal heat] in animal and vegetable organisms.¹

This theory of digestion met with much favor, and was adopted and developed by many physicians of subsequent date. It is the doctrine defended by Galen and the dogmatic school, and therefore the casual reader would naturally suppose that it represents the whole medical tradition, especially since Galen with pardonable zeal, though with little historical sense, reads the orthodox view into Hippocrates and all the noble line of the 'ancients.' It would lead us too far afield if we should attempt to trace the history of the later Greek theories of digestion, a task for which the writer freely confesses that he is not prepared; but it is highly important for our subject to pursue the question somewhat farther. Before passing on to this inquiry it is perhaps worth while to remark that the seeming preponderance of authorities is no satisfactory criterion by which to judge of the relative standing of the rival theories of nutrition, since the survival of the extant medical works was obviously conditioned by their acceptability in the Middle Ages, when the sway of the Aristotelian philosophy, with which they in the main agree, was complete. We are therefore prepared to discount their testimony.²

Celsus says³ that medical writers, considering the matter of digestion one of the greatest importance, devote their attention chiefly to it, and gives a resumé of the doctrines proposed on this head; the Empirical school, however, held that it mattered not how food was digested, but

¹ As Aristotle's philosophy, in spite of its failure to correlate certain doctrines, presents itself as a whole complete and essentially unchanged in all his works, we can discover no development within it. Hence it is impossible to say whether cosmic *ἀναθυμίασις* or physiological *πέψις* first appeared to him to involve *ἀλλοίωσις*; but it is interesting to note that he found his favorite principle in both processes.

² But the chance discovery of the Anonym. Londin. (cf. 24, 19 f.) may well caution us against going too far in the opposite direction.

³ *De Medicina*, I, *Prooem.* (4, 16 Daremb.): Ex quibus quia maxime pertinere ad rem concoctio [Gr. *πέψις*] uidetur, huic potissimum insistent; et, duce Erasistrato, teri cibum in uentre contendunt; alii, Plistonico Praxagorae discipulo, putrescere; alii credunt Hippocrati, per calorem cibos concoqui: acceduntque Asclepiadis aemuli, qui omnia ista uana et superuacua esse proponunt; nihil enim concoqui, sed crudam materiam, sicut assumpta est, in corpus omne diduci.

what food was most nutritious.¹ From various sources we obtain similar catalogues, evidently derived from the medical doxographers.² Galen calls the roll of honor among the ancients,³ naming Hippocrates, along with Aristotle, as an exponent of his own theory of digestion.

Hippocrates, it is claimed, held that digestion (*πέψις*, in the meaning given to the term by Aristotle and Galen) is effected by the internal heat. It is true, as we have seen,⁴ that the heat of the body is here recognized as necessary to the proper preparation of food for the office

¹ *Ibid.* (7, 2 Daremb.): sed has latentium rerum coniecturas ad rem non pertinere; quia non intersit, quid morbum faciat, sed quid tollat, neque quomodo, sed quid optime digeratur, siue hac de causa concoctio incidat siue de illa, et siue concoctio sit illa siue tantum digestio. Note the use of terms. *Concoctio* is the equivalent of *πέψις* when applied to the process of nutrition, whereas *coctio* is used to render the word when it relates to pathological conditions; *digestio*, as its natural force suggests, is here employed to characterize 'digestion' considered merely as a process of comminution and separation of the food-stuff into its several constituents. Elsewhere (see following note) it is used as the generic term, including *concoctio* as well as *digestio* proper. In view of the fact that both *πέψις* (see following note) and *concoctio* could be used in a lax general sense, without implying anything as to the character of the process, it seems unaccountable, except on the basis of dogmatic prejudice, that Galen should hold that the definition of *πέψις* as *ἀλλοίωσις* was generally accepted (cf. p. 160, n. 3).

² Ps.-Soranus, *Quaest. Med.* 61 (*Anecd. Graeca et Graecolatina*, ed. Rose, II, p. 255): Quomodo Hippocrates et Erasistratus et Diocles et Genoetas (?) et Asclepiades philosophi digestionem cibi et potus fieri dixerunt? Hippocrates ab innato in nobis calore fieri digestionem dixit, Erasistratus vero teri et solvi [= digeri], Diocles autem putrescere, Genoetas a natura elimari [= λεαινεσθαι], Asclepiades autem per exercitationem corporis fieri dixit. Ps.-Galenus, *Def. Med.* 99 (19, 372 K): τὰς πέψεις τῆς τροφῆς Ἱπποκράτης μὲν ὑπὸ τοῦ ἐμφύτου θερμοῦ φησι γίνεσθαι, Ἐρασίστρατος δὲ τρίψει καὶ λειώσει καὶ περιστολῇ τῆς γαστρὸς καὶ ἐπικτήτου πνεύματος ιδιότητι. Ἐμπεδοκλῆς δὲ σήψει· οἱ δὲ ἐξ ὧμῶν ἔφασαν τὰς ἀναδόσεις γίνεσθαι, ὥσπερ καὶ Ἀσκληπιάδης ὁ Βιθυνός.

³ Galen, II. φυσικῶν δυνάμεων, 2, 8 (2, 118 K): περὶ δὲ τῆς τῶν χυμῶν γενέσεως οὐκ οἶδ' εἰ ἔχει τις ἕτερον προσθεῖναι σοφώτερον ὢν Ἱπποκράτης εἶπε καὶ Ἀριστοτέλης καὶ Πραξαγόρας καὶ Φιλότιμος καὶ ἄλλοι πολλοὶ τῶν παλαιῶν. ἀποδέδεικται γὰρ ἐκείνοις τοῖς ἀνδράσιν ἀλλοιουμένης τῆς τροφῆς ἐν ταῖς φλεψὶν ὑπὸ τῆς ἐμφύτου θερμασίας αἷμα μὲν ὑπὸ τῆς συμμετρίας τῆς κατ' αὐτήν, οἱ δ' ἄλλοι χυμοὶ διὰ τὰς ἀμετρίας γιγνόμενοι· καὶ τοῦτ' αὖτε λόγῳ πάντ' ὁμολογεῖ τὰ φαινόμενα. For Hippocrates, see also *ibid.*, I, 12 (2, 30 K). Regarding Praxagoras and Philotimus we are not in a position to judge the correctness of Galen's statement. Probably, however, their views coincided generally with that of 'Hippocrates.'

⁴ P. 159, n. 2, above.

of alimentation; but there is no trace of the distinctive conception which we find in Aristotle. So far as one may judge, heat was regarded as furthering the nutritive process much as cooking the food-stuff facilitates it.¹ The change effected is merely that of rendering the substances more readily digestible.² The amount of nutriment ingested has much to do with the proper disposal of it; if an even (equal) amount is taken, the body is evenly nourished, since it 'masters' the food; if it varies, the food masters³ the body, and the normal balance is disturbed to the detriment of health. Galen was particularly impressed with the supposed agreement of *Περὶ τροφῆς*⁴ with himself in regard to nutrition. To be sure he did not always regard the tract as the work of Hippocrates,⁵ but he was clearly overjoyed to discover his favorite conception so plainly, as he thought, anticipated by the author.⁶

¹ I do not find this expressly stated, but it is clearly implied, in Hippocrates; Aristotle, however, who in many respects merely developed the thought of the earlier medical tradition by introducing distinctions and auxiliary conceptions foreign to his predecessors, elaborates the comparison *Meteor.* 381a 9: ἡ μὲν οὖν κατὰ τὴν ἐψησιν λεγομένη πέψις τοῦτ' ἐστίν· καὶ οὐδὲν διαφέρει ἐν ὀργάνοις τεχνικοῖς ἢ φυσικοῖς, ἐὰν γίγνηται· διὰ τὴν αὐτὴν γὰρ αἰτίαν πάντα ἔσται, adding the 'Hippocratean' observation that art merely imitates nature, *ibid.*, 381b 6: μιμεῖται γὰρ ἡ τέχνη τὴν φύσιν, ἐπεὶ καὶ ἡ τῆς τροφῆς ἐν τῷ σώματι πέψις ὁμοίᾳ ἐψήσει ἐστίν.

² *Π. τροφῆς*, 49 (9, 118 L.): ὑγρὴ τροφή εὐμετάβλητος μᾶλλον ἢ ξηρή· ξηρὴ τροφή εὐμετάβλητος μᾶλλον ἢ ὑγρὴ· ἡ δυσαλλοίωτος δυσεξανάλωτος, ἡ εὐπρόσθετος εὐεξανάλωτος. The meaning of this is made clear by c. 51 *ibid.*: μῦες (muscular tissues) στερεώτεροι δυσέκτηκτοι <μᾶλλον> τῶν ἄλλων, παρέξ ὀστέου καὶ νεύρου· δυσμετάβλητα τὰ γυμνασμένα, κατὰ γένος αὐτὰ ἐωυτῶν ἰσχυρότερα ἐόντα, διὰ τοῦτο αὐτὰ ἐωυτῶν δυσστηκτότερα.

³ Hipp. *Π. τόπων τῶν κατὰ ἄνθρωπον*, 43 (6, 336 L.). See above, p. 155.

⁴ 9, 98 f. L.

⁵ The scholion at the beginning of *Π. τροφῆς* (adnot. 9, 98 L.) says: τοῦτο σύγγραμμά φησιν ὁ Γαληνὸς μὴ εἶναι Ἱπποκράτους, πλὴν ἄλλ' οὐδὲ παλαιοῦ του τυχόντος σοφοῦ (so far probably we have to do with Galen; the following guesses belong to other authors), καὶ ἴσως εἴη τοῦ Θεσσαλοῦ· δοκεῖ δὲ ὑπὸ Ἡροφίλου συγκεῖσθαι. In his commentary on the treatise Galen (15, 220 f. K.) everywhere assumes that it is both 'ancient' and Hippocratic. Similar diversities of opinion on the part of Galen are met with in regard to other members of the Corpus Hippocrateum.

⁶ It were useless to cite the expressions of Galen which show that he interpreted the treatise as in accord with Aristotle. The difference is indeed slight in compass, so to speak, but what is lacking in Hippocrates is the doctrine of ἀλλοίωσις and ἐξομολώσις. Aristotle clearly derived his general doctrine from this treatise and others like it, such as those cited below in illustration of the text.

In order to be able to judge of the truth of this contention, we may best present the relevant passages. (c. 2) 'Nutriment increases and strengthens and adds flesh and maintains and changes the constituents of the several parts of the body according to the constitution of each member and its original quality (or constituent). (c. 3) It maintains the organism in constitution and quality when the nutriment ingested is mastered¹ and the nutriment already in the body prevails.² (c. 4) Sometimes the nutriment previously ingested, sometimes the later-coming nutriment, becomes in time weak (i. e., overpowered) by being discharged or added to.³ (c. 5) Both alike are enfeebled in time and after a lapse of time, both by the continuous ingestion of nutriment from without and by food that remains long⁴ solidly fixed in all the members (the system). (c. 6) And it produces⁵ its own kind, but changes the former nutriment and is carried off; sometimes, however, it enfeebles the previously ingested nutriment and nutriment taken even earlier.⁶ (c. 8) Nutriment (is used in different senses: it) means now that which is nourishing the organism, now that which is of a kind to serve as nutriment, now that which is presently to nourish the system.'

A disinterested study of these pronouncements yields the result that Galen was not justified in interpreting them as presenting the Aristotelian doctrine of digestion. Littré was quite right in saying that the Hippocratics knew, so to speak, only the beginning and the end of the

¹ Read *κρατέηται* here for MS. *κρατέη*. Since I perceived the necessity of this change I have noted two other scholars who propose it.

² Cf. II. *διαίτης ὑγιεινῆς*, 7 (6, 82 f. L.); II. *φυσέων*, 7 (6, 98 f. L.); II. *διαίτης*, 3, 74 (6, 614 f. L.); II. *νούσων*, 4, 42 f. (7, 562 f. L.).

³ Cf. II. *τόπων τῶν κατὰ ἄνθρωπον*, 42-44 (6, 334 f. L.). The use of *ἐξίτηλος* = 'weak' deceived Galen and Littré: *γίνεται ἐξίτηλος* simply = *ἀμαυροῦται*; cf. c. 5 and above, p. 154, n. 2.

⁴ Cf. II. *φυσέων*, 7 (6, 100 L.).

⁵ *ἐξεβλάστησε*, which Littré renders 'rejetée sa propre forme.' The word seems, however, to be most naturally taken as above; cf. c. 54 (9, 120 L.): *δύναμις* ('quality or qualitatively fixed ingredient of food'?) or, as Littré says, 'la force, c'est-à-dire la propriété par laquelle le corps s'assimile l'aliment'?) I incline to the former view) *πάντα αὔξει καὶ τρέφει καὶ βλαστάνει*. The meaning here given to *δύναμις* is of course common in Hippocrates, and seems to accord best with the following, and final, words of the treatise: *ὑγρασίη τροφῆς* (i. e., *δυνάμεων*) *ἄχρημα*.

⁶ I here omit *ιδέην ἐξαλλάττει* with the vulgate. The general sense of the passage is perhaps best illustrated by II. *νούσων*, 4, 42 (7, 562 f. L.).

process of alimentation;¹ of digestion (πέψις) in the narrower sense, implying the conversion (ἀλλοίωσις) of potential into actual nutriment, they knew nothing, and advanced no theory to account for it. This conclusion is supported by the report we receive of the doctrines of Aegimius² (probably a contemporary of Hippocrates), of Diocles,³ and of Plato. Plato is particularly clear in his exposition, and shows that the view, which we have characterized as that of the pre-Socratics generally, was expressly formulated.⁴ His use of the conception of fermentation or putrefaction likewise shows, if, indeed, the occurrence of the notion in Empedocles were not sufficient proof, that this process also

¹ *Œuvres Complètes d'Hippocrate*, 9, 94: 'Les hippocratiques ne connaissaient, quant à l'aliment, que les deux termes extrêmes: ils savaient qu'il était introduit dans le canal digestif et *assimilé à chaque partie, devenant* os dans les os, muscle dans les muscles, veine dans les veines, et ainsi du reste. Mais toutes les opérations intermédiaires leur étaient inconnues.' The words italicized are due to his acceptance of the interpretation of Galen, which I believe has been shown to be unfounded.

² Diels, Anonym. Londin. 13, 40: φησὶν δὲ τρέφεσθαι τὰ σώματα ὑπὸ τῆς νεαρᾶς καὶ ἀπέπτου τροφῆς, γεννηθείσης δὲ τῆς πέψεως καὶ ἀναδόσεως κενούσθαι τὰ ἀγγεῖα καὶ τὰς διεξόδους. These words are a part of the excerpts from Menon's *Iatrika*, and well illustrate the doxographic method. First it is stated that nutrition is accomplished by 'fresh and (in the Aristotelian sense) undigested' food; then mention is forthwith made of digestion (πέψις) in the untechnical sense. As Diels (in the Index, s. v., to Anonym. Londin.) is probably right in calling Aegimius 'aequalis fere Hippocratis,' it follows that the report has been accommodated to the controversy started by Aristotle.

³ See Wellmann, *Fr. der gr. Ärzte*, I, p. 85 f.

⁴ *Tim.* 78 E: ὁπότεν τὸ πῦρ . . . διὰ τῆς κοιλίας εἰσελθὼν τὰ σιτία καὶ ποτὰ λάβῃ, τήκει ('dissolves') δῆ, καὶ κατὰ σμικρὰ διαιροῦν . . . 80 D: τέμνοντος μὲν τὰ σιτία τοῦ πυρός, αἰωρουμένων δὲ ἐντὸς τῷ πνεύματι ξυνεπομένον, τὰς φλέβας τε ἐκ τῆς κοιλίας τῇ ξυναιωρήσει πληροῦντος τῷ τὰ τετμημένα αὐτόθεν ἀπαντλεῖν· καὶ διὰ ταῦτα δὴ καθ' ὅλον τὸ σῶμα πᾶσι τοῖς ζώοις τὰ τῆς τροφῆς νάματα οὕτως ἐπέρρνυται γέγονε. νεότμητα δὲ καὶ ἀπὸ ξυγγενῶν ὄντα . . . πανταδαπὰ μὲν χρώματα ἴσχει διὰ τὴν ξύμμειξιν, ἣ δ' ἐρυθρὰ περὶ αὐτὸ χροὰ διαθεῖ, τῆς τοῦ πυρός τομῆς τε καὶ ἐξομόξεως ἐν ὑγρῷ δεδημιουργημένα φύσις . . . 81 A: ὁ δὲ τρόπος τῆς πληρώσεως ἀποχωρήσεως τε γίνεται, καθάπερ ἐν τῷ παντὶ παντὸς ἢ φορὰ γέγονεν, ἣν τὸ ξυγγενὲς πᾶν φέρεται πρὸς ἑαυτὸ κτέ. down to 81 E. In view of the general agreement of Diocles and Plato and their dependence on the same authorities or authority (Wellmann thinks it was Philistion), this clear-cut statement is doubly important. Fire works no inner change (ἀλλοίωσις), but merely comminutes the food and so prepares it for absorption and distribution by the blood.

involved nothing inconsistent with the purely mechanical theory of nutrition generally current up to the time of Aristotle.¹

It is not our purpose at this time to follow the conception of Aristotle through the later period of Greek thought; but it is noteworthy that two of the foremost physicians in their time, Erasistratus and Asclepiades of Prusa, definitely repudiated it. We have seen that Aegimius was reported to have said that the body was nourished by 'fresh and undigested' food; but our account has shown that this must be a mere inference from what he actually said, since there was no theory of digestion then in existence that called for a specific denial. In all probability Aegimius merely said, as did the entire early medical tradition, that like nourished like, expressly emphasizing this fact much as we see it presented by Plato. But with Erasistratus and Asclepiades the case was different. The former was closely associated with Theophrastus, who, as the successor of Aristotle in the Lyceum, adhered to his doctrine. When, therefore, Erasistratus rejected the Aristotelian conception of digestion, he must have done so advisedly and expressly. That Asclepiades deliberately and in express terms repudiated the view is clear from the records.²

Now this fact is of great importance for the history of the post-Aristotelian corpuscular theories. In the case of Asclepiades we can prove with absolute certainty that the rejection of the Aristotelian conception of digestion was only a symptom, so to speak, of his thought as a whole; for it was intimately connected with his doctrine of the 'fragile molecules' or *ἀναρμοὶ ὄγκοι*. Since we have elsewhere proved this,³ the case need not here be restated. But other conclusions at once suggest themselves. The *ἀναρμοὶ ὄγκοι* are possessed of indefeasible qualities,

¹ See Wellmann, *l. c.*, for *σῆψις* and *ζύμωσις*. I believe that 'decay' and 'fermentation' were understood only as a process of dissolution of the organic compound into its constituent parts, which were thus prepared for the function of nutrition by the accession of like to like. Yet the instances I have gathered of the use of *σῆψις* indicate that we have here a very important conception in medical circles, which well deserves further investigation.

² For Erasistratus and Asclepiades, see above, p. 161, n. 3, and p. 162, n. 2, and my article, *Τὰ ἀναρμοὶ ὄγκοι of Heraclides and Asclepiades*, in *Trans. Am. Phil. Assoc.* XL (1910), p. 8, n. 3. For a full statement of the views on digestion of the two principal medical 'schools' after Aristotle, see Galen, II. *φυσικῶν δυνάμεων*, I, 11 f. (2, 25 f. K.).

³ See the article referred to in the preceding note.

and they are infinitely divisible, being separated and divided by 'pores so minute as to be apprehended only by the reason,' and from all things there is flowing an unintermittent stream of effluvia. In all this we recognize the thought of the pre-Socratic medical tradition, and of Empedocles and Anaxagoras. We should perhaps be inclined to doubt this conclusion if Asclepiades stood alone; but we see that in one particular, that is in regard to the theory of digestion, the gap between Asclepiades and Plato is filled by Erasistratus, which of itself suggests a true succession in the line of the medical tradition. But we are happily able to supply other links which likewise point to the medical tradition as the intermediary between Anaxagoras and Asclepiades; for the originator of the name, and doubtless of the theory, of the *ἀναρμοὶ ὄγκοι*, was Heraclides of Pontus, a contemporary of Aristotle and associated alike with him and with Plato. The interest of Heraclides in medicine is attested by the catalogue of his writings,¹ and it is fairly certain that he was acquainted with the somewhat younger Erasistratus.

There is, moreover, another link in the chain; Strato, second in succession to Aristotle in the headship of the school, and the most scientific master of the Peripatetics, supplies, as it were, all the clues necessary to guide one through the tangled maze. Since Diels, by utilizing the introduction to Hero's *Pneumatica*, recovered in large part the physical philosophy of Strato,² at least in outline, we are able to detect the connection between it and the medical principles of Erasistratus. Diels here apparently sees only the debt of Erasistratus to Strato, not perceiving that the thought of the latter harks back at almost every important point to the assumptions and conceptions due to the older medical tradition; even where Strato agrees with Aristotle, the emphasis and point of view seem to be those of the fifth century. Like most leaders of thought in the third century, Strato obviously revolted against the dominion of metaphysics in which Aristotle ruled supreme, and felt himself akin in spirit to the pre-Socratics. The so-called 'qualities' (*ποιότητες*,³ *δυνάμεις*) of Strato have no affinity with

¹ Diog. L. 5, 87, mentions *Ἀτρίαι περὶ νόσων α'*.

² Diels, *Über das physikalische System des Straton*, *Sitzungsb. der Berl. Akad.* 1893, I, p. 101 f.

³ See Diels, *op. cit.*, p. 112, n. 2. Zeller, *Phil. der Gr.*, IIb, p. 907, regards the *δυνάμεις* as 'die diese Eigenschaften bewirkenden Kräfte,' but he is in error; they are just the *ποιότητες* under the old name, familiar from Hippocrates.

the metaphysically or logically conceived qualities of Aristotle, which play like unreal shadows over an abstract mathematical figure, but are rather, like the 'fragile molecules' of Heraclides,¹ or the homoeomerics of Anaxagoras, or the 'elements anterior to the elements' of Empedocles, divisible granules of matter possessing indefeasible properties, such as the older medical tradition employed to explain the phenomena of nutrition and the permanence of species. In a word, they were *semina certa*. Like Heraclides, Strato engaged in a polemic against the atomism of Democritus.² It is greatly to be regretted that we do not learn here what arguments they brought to bear upon the theory. They may have contented themselves with repeating those already advanced by Aristotle, but it is not impossible that they added others of a physiological order, since their own hypotheses were found to be especially welcome to physicians. The 'elements,' i. e., the fundamental qualities, postulated by Strato, we are told,³ were the warm and the cold. Herein he agreed with Aristotle, but for the latter the doctrine had little significance. In the Hippocratic literature, however, the hot and the cold play a prominent part.⁴ Like Aristotle, again, Strato denied the existence of a void in the sense of the Atomists: he refused to admit a continuous void (*ἄθροῦς κενὸς τόπος*), but assumed the presence of minute interstitial empty spaces.⁵ In this, it would seem, Asclepiades agreed with him, although the precise doctrine of the much maligned physician is in this, as in many other respects, difficult to determine, because we know him only from references in unintelligent or prejudiced authors. In regard to Strato's theory of the interstitial void we have only the arguments belonging to mechanics and the physical theory of light; but it is altogether probable that he applied the theory to explain not only the problems of hydrostatics and the absorption or diffusion of light, but also that of suction in suction pumps and in the circulatory

¹ Diels, *op. cit.*, p. 112, n. 4, likewise notes the similarity.

² For Heraclides, see Diog. L. 5, 87, who mentions among the *φυσικά* a work entitled *Περὶ εἰδῶλων πρὸς Δημόκριτον*; for Strato, see Diels, *op. cit.*, p. 112, n. 1.

³ Stob. *Ecl.* 1, 298: *Στράτων στοιχεῖα τὸ θερμὸν καὶ τὸ ψυχρόν*. Cf. Zeller, *op. cit.*, II^b, p. 907, n. 7.

⁴ Cf. Fredrich, *Hippokratische Untersuchungen*, p. 134 f.

⁵ See Diels, *op. cit.*, p. 104 f., who points out the debt of Erasistratus to Strato in this particular.

system of the human body. If the latter be true, as it appears to be, we must connect with the acceptance of 'dispersed' void the circular system of alimentation and respiration, which Strato adopted from the old medical tradition as transmitted by Diocles,¹ Plato, and Aristotle. Essentially this theory is an exemplification of the ancient tug-of-war between the elemental hot and cold, in which the void created by the retirement of one contestant is closed by the hot pursuit of the other (ἀκολουθία πρὸς τὸ κινούμενον). All this points clearly to a lively interest in medicine, which is borne out by the titles of works ascribed to Strato, such as his treatise *On Diseases* and *On Alimentation and Growth*.

We have devoted so much space to the subject of nutrition, not only because the history of the conceptions involved in it has not been written, but also because the process has the greatest significance for the corpuscular theories of the Greeks. Intimately connected with alimentation are several other physiological subjects which can here receive only a passing notice. We have repeatedly remarked that the principle of *semina certa* was invoked not only by those who adhered to the conception of the medical tradition, that like feeds like, in the most literal sense, but also by the Atomists, whose atoms are 'determinate seeds' in quite a different way. The principle *e nihilo nil fit*, as we have seen, also appeals to the fact that like begets like; and from early times it was common to speak of the 'elements' or 'principles' of things as 'seeds,' or to use a Lucretian phrase, as *genitalia corpora rebus*. The development of cosmology or cosmogony out of 'theology' or theogony may be held in part to explain such forms of expression; but we must not forget that primitive modes of thought persist in slightly varying disguises even where one is least prepared to find them. To the Greek, except where the Socratic teleology prevailed, a thing was regularly defined with reference to its antecedents, i. e., with reference to its 'elements' or its constitution, viewed as the result of a process of composition.² Aristotle well illustrates the different points of view in a concrete case when he says:³ 'We must state the matter in a way

¹ See Wellmann, *Fr. der gr. Ärzte*, I, p. 42 f.

² See my study, *Περὶ Φύσεως*, *Proc. Amer. Acad. of Arts and Sc.* XLV, p. 79 f.

³ *De Gen. animal.* 725^a 21 f.

exactly opposite to that of the ancients; for they said that the seed is that which is derived from the entire organism, whereas we shall say that it is that which is so constituted as to pass into every part.'

The nature of the seed and of the reproductive process and the problems of embryology¹ were apparently always closely associated by the Greeks with alimentation; and the same principles were felt to apply in all. Not to refer to less important evidence,² it is sufficient to consult Aristotle's discussion of the nature of seed in *De Generatione animalium* I, 17 f. The view which he attributes to 'the ancients' is that seed is contributed by both sexes and that it comes from all parts of the body, just as food is disseminated throughout the body. Now we know that this opinion was held by Alcmaeon, Parmenides, Empedocles, and perhaps by Anaxagoras;³ even if Anaxagoras did not believe that the female contributed seed, there can be no doubt that he regarded the seed as proceeding from the entire male body. Now it is worthy of remark that Empedocles did not originate this doctrine, which is a strict corollary to that of the nutrition of like by like, but that we can trace it back to Parmenides and Alcmaeon. It is hard to believe otherwise than that these closely related principles formed a part of the medical tradition which Empedocles, as a physician, received from the schools or guilds. This conception of the seed was employed to explain the similarity of offspring to parent and even the inheritance of acquired characteristics.⁴ In his discussion of this theory Aristotle makes a statement which discloses the relation of the problems, at least as he saw it. 'This view,' he says,⁵ 'appears to resemble that of Anaxagoras, that none of the homoeomeries originates; except that he generalizes the principle, whereas these men apply it only to the generation of animals. Moreover, how shall these elements which flow from the entire organism grow? For Anaxagoras, in conformity with his theory, says that flesh is added to flesh from the food.' Aristotle thus clearly indicates that there were those who considered the problem merely from the

¹ Cf. Hipp. II. φύσις παιδίου, 17 (7, 496 f. L.).

² See Wellmann, *op. cit.*, I, pp. 51-54, and Diels, *Anonym. Londin.* 25, 41 f.

³ See Fredrich, *op. cit.*, p. 126 f.

⁴ Cf. Hipp. II. δέρων, ὑδάτων, τόπων, 14 (2, 60 L.), the case of the Μακροκέφαλοι, and Arist. *de Gen. animal.* 721^b 28 f.

⁵ Arist. *ibid.*, 723^a 6 f.

point of view of physiology, and did not, like Anaxagoras, translate the special conception in terms of a general philosophical principle. Whom he had in mind we do not know, but we naturally think of such as Parmenides and the medical fraternity.¹

We have already too long tarried with the subjects under consideration. Yet we must not drop them altogether without adding a few words regarding their significance. Unless our efforts have been altogether in vain, we may say, with Lucretius, from the point of view disclosed in the primitive conceptions of the Greeks, *corporibus caecis igitur natura gerit res*. Much that has been said above may be questioned, but it will be difficult to maintain that Empedocles and Anaxagoras, or even Heraclitus, introduced the ideas upon which the corpuscular theories are founded. It matters little in fact who first spoke of effluences (*ἀπορροαί*) or molecules (*ὄγκοι*): even if we could trace these terms to their source, we should not have reached the beginnings of the conceptions. These lie in the dateless age before the birth of history.

We have said little about the other cardinal postulate of the Atomists, the void. Every student knows that this conception is not primitive, but had its origin in a determined effort to meet a metaphysical objection, and hence is itself metaphysical. As such it falls outside the range of our present study, and might be disregarded altogether were it not that it had antecedents of a primitive character. The processes of evaporation, respiration, nutrition, and generation, which we have been studying, presuppose and postulate not only a corpuscular, but also a porous constitution of things. It is not without interest, therefore, that the very term 'pores' (*πόροι*) can be traced back to the sixth century; for we find it in Alcmaeon, and the scope it already had in his thought indicates that it can hardly have originated with him. The facts adduced by Lucretius to prove the existence of a void were with few exceptions known to primitive man, although not interpreted as the Epicurean interprets them. Aristotle also, in enumerating the considerations that led the Atomists to postulate a void, mentions the facts of nutrition and growth. 'Furthermore,' he says,² 'growth is regarded by

¹ See Hipp. II. *νούσων*, 4, 32 (7, 542 L.); II. *γυναικῶν*, I, 24 (8, 62 f. L.); and Wellmann, *Fr. der gr. Ärzte*, I, p. 35, n. 2.

² Arist. *Phys.* 4, 6, 213^b 18 f. Cf. *de Gen. et Corr.* I, 8, 325^a 34-^b 5; Hipp. II. *προφῆς*, 7 (9, 100 L.); Lucr. I, 350 f.

all as taking place through a vacuum ; for they say that nutriment is corporeal and that two bodies may not occupy the same space at the same time.' We should clearly overvalue Aristotle's words if we accepted them as strictly true ; but we may safely conclude from them that the Atomists did appeal to the facts in question in support of their assumption.

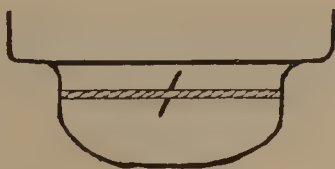
If we accept the conclusion to which our study points, many questions hitherto much debated may henceforth be disregarded, or at least they must be restated. Thus the arguments pro and con, touching the priority of Empedocles or Leucippus in regard to the pores, fall to the ground, and with them most of the considerations which have been urged to establish a more intimate relation between these philosophers and Anaxagoras. A question much more profitable arises, however, in the older one's stead, viz., whether there are not in the Atomic theory a number of conceptions which ill fit into the general theory and owe their presence there only to historical reasons, or are in other words mere illogical survivals from older theories. If this should prove to be the case, as it appears to be, it would have a direct bearing on the chronological problem, and possibly on the mooted question whether Leucippus, a contemporary of Empedocles, or Democritus, a younger contemporary of Socrates, originated the Atomic theory. Εἰς αὐθις τοῖνυν· νῦν γὰρ σπεύδω ποι, καί μοι ἄρα ἀπιέναι.

THE ΥΠΟΖΩΜΑΤΑ OF GREEK SHIPS

BY EDWARD G. SCHAUROTH

IN the myth near the end of the *Republic* where Plato is describing to us the structure of the universe (616, c) we read: καὶ ἰδεῖν [ἔφη] αὐτόθι κατὰ μέσον τὸ φῶς ἐκ τοῦ οὐρανοῦ τὰ ἄκρα αὐτοῦ τῶν δεσμῶν τεταμένα — εἶναι γὰρ τοῦτό τὸ φῶς σύνδεσμον τοῦ οὐρανοῦ, οἶον τὰ ὑποζώματα τῶν τριήρων, οὕτω πᾶσαν συνέχον τὴν περιφοράν. Here, apart from the confused structure of the main clause and its obscurity, the additional question presents itself: What is meant by the ὑποζώματα of the triremes? Although the problem has at many times been carefully and differently treated by eminent scholars, no satisfactory explanation of it has yet been given, so that the following account which seeks to interpret the passage of Plato while at the same time conforming with the evidence at hand, may be pardoned for inevitable shortcomings.

The theory I have to propose is that the ὑποζώματα here mentioned are not braces attached to the outside of the ship as has always been assumed, but that, on the contrary, they were undergirders of rope, or perhaps chains, transversally stretched across the ship's hold under the deck, and attached at either end to one of the stout rib pieces. If two or more ropes were thus attached in one place, it would be possible by means of a bar or lever inserted between them, to twist them as taut as desired, and so brace up the ship for an emergency. The same device, I am told, is to-day employed on many canal-boats.

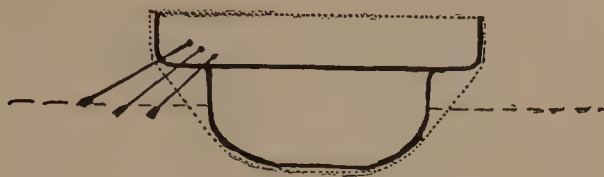


Let us see how such an hypothesis conforms with the evidence available in ancient writers.

Many have thought that the *ὑποζώματα* were ropes simply wound round and round the outside of a ship to keep it from going to pieces in a storm, much as one would tie a string around a split broomstick to hold it together; and they adduce as evidence a practice of this kind sometimes even now resorted to in the case of small boats, called frapping. That this, however, could very well have been done in the case of triremes at the coming on of a storm, hardly seems probable, not to say possible, when one thinks of the difficulty that would be encountered in trying to pass a rope over one of the ship's sides, pass it underneath, and recover it again on the other side between the many projecting oars; then repeat this process enough times thoroughly to bind the ship, and all this in rough water with a storm imminent. For to suppose that ropes of this kind were constantly carried in position, all wrapped around the hull ready to be tightened, is unreasonable because of the resistance they would necessarily offer to the ship's course in calm weather, and the certainty of their being frayed and crushed when the ship was dragged out of water, a regular practice among the Greeks.

Most of the passages in ancient authors which bear on the subject are unsatisfactory in that they give no explanation of terms. So in the famous passage about Paul's shipwreck in *Acts* (xxvii, 17) we read: ἦν [τὴν σκάφην] ἄραντες βοηθείαις ἐχρῶντο ὑποζωννύντες τὸ πλοῖον. Here the hoisting of the small boat had nothing to do with the process of undergirding, for *πλοῖον* is the name applied to the large ship throughout the narrative, so that the subordination of ideas appears somewhat illogical, and at first sight misleading. Whatever may have been the nature of the undergirding, granted even that by it is meant the process of frapping, it does not seem likely that such could have been the practice on men-of-war; for whereas this might well have been done to a merchant ship of regularly rounded hull, yet on a trireme with sides overhanging to admit of three banks of oars (as is usually supposed to have been the construction) such frappings would have added nothing to the support of the ship. The tension of the cables, as can be seen from the diagram, would bring too much stress to bear upon the over-

hanging parts, and would leave much of the hull, the very part most in need of support, quite free.



So too in Thucydides (1, 29) we read of the Corcyreans: καὶ τὰς ναῦς ἅμα ἐπλήρουν ζεύξαντές τε τὰς παλαιὰς ὥστε πλοῖμους εἶναι καὶ τὰς ἄλλας ἐπισκευάσαντες. Likewise Appian says of Pompey when he had the enemy at a disadvantage because most of their ships had been broken up by a severe storm (*Bell. Civ.* 91): ἀλλ' ὑπερείδεν ἐκ τῶν δυνατῶν διαζωννύμενους τὰ σκάφη καὶ ἀνέμῳ διαπλέοντας εἰς τὸ Ἰππώνειον.

These two passages are significant for the word used in each case to denote the process in question. Thucydides says ζεύξαντες, which seems more in accordance with the view I have taken than with the supposition that the ὑποζώματα were bound around the outside. A brace of this kind might properly be spoken of as a yoke binding the two sides of the ship. So too, Appian uses instead of ὑποζωννύναι the compound διαζωννύναι, which again would be quite appropriate for a brace stretched through and across a ship's hold. It does not seem unnatural to suppose that the term ὑπόζωμα may have been borrowed from the primitive method of frapping, a transference of meaning that can be seen in our English word 'girder.' Then the verb ὑποζωννύναι occurs but once with reference to ships, apart from the passage in *Acts* (Polybius, 17, 3, 3). Thucydides in the fifth century had as yet no more definite verb than ζευγνύναι, which he must have chosen to *describe* the process. He was apparently not under compulsion to render, in his verb, the ὑπό of the noun, so that it becomes the easier for us to assume that the force of ὑπό, whatever it may originally have been in ὑπόζωμα, was lost, as apparently in other words also, e.g. ὑποκρίνεσθαι, ὑπόκρισις, ὑποκριτής. Still we find that in many compounds of ὑπό the force of the preposition is expressive of the idea 'within.' ὑποδέχεσθαι means to receive under one's roof and so within the house, and the adjective ὑποδέξιος used by Herodotus as applied to harbors can only mean such harbors as 'receive within'; ὑποδέξιοι λιμένες are

therefore capacious, hospitable harbors. The same notion seems embodied in other words as *ὑπάργυρος*, *ὑποθάλλειν*, *ὑποβένθιος* — ‘having silver within,’ ‘to make warm from within’ (surely ‘to make warm from the bottom up’ when applied to the passions would be absurd), ‘in the depths below’ (where *ὑπό* gives simply the notion of ‘down.’ The parts of the word are merely coördinate, *ὑπό* intensifying the other member). Accordingly, it does not seem unnatural to assume this force for the preposition in *ὑπόζωμα*, supposing that the *ὑποζώματα* were within the ship, somewhere below the deck, say at whatever point it would be found their support was greatest. Nor again does it seem strange that there should be no definitely accepted verb derived from *ὑπόζωμα* but that variants should occur which aim, perhaps, at a clearer definition or a more appropriate compounding. It is precisely this that the unlike terms of Thucydides and of Appian seem to me to indicate.

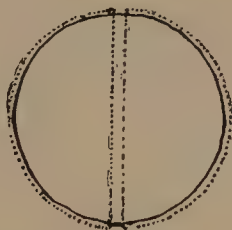
A third, and to my mind highly important, passage bearing on this question of the place of attachment of the *ὑποζώματα* is in the *Argonautica* of Apollonius Rhodius I, 368. Here we read :

νῆα δ' ἐπικρατέως Ἄργου ὑποθημοσύνησιν
 ἔζωσαν πάμπρωτον ἐυστρεφεῖ ἐνδοθεν ὄπλῳ
 τεινόμενοι ἐκάτερθεν, ἔν' εὖ ἀραροίατο γόμοις
 δούρατα καὶ ῥοθίοιο βίην ἔχοι ἀντιώσαν.

In this passage I call attention to the words *ἐνδοθεν* and *ἐκάτερθεν* — ‘from within’ and ‘from both sides.’ Boeckh, Shaw, and other commentators found the passage inexplicable on account of the mention of girding a ship ‘on the inside’; and because they did not understand it, decided that the text must be corrupt, and the lines rejected as they stand. Breusing in his book, *Die Nautik der Alten* goes far out of his way to explain the passage, assuming a device that would rather have pulled a vessel to pieces than have given it stability (pp. 171-2). According to the view I have adopted, there is nothing extraordinary about such a statement as that of Apollonius: in fact it is quite simple, for where else would such a girder be more likely to be drawn taut than on the inside of a ship? We may well consider, too, as Breusing remarks, that Apollonius through his long residence at Alexandria must have had exceptional opportunities for observing the equipment and handling of all kinds of ships.

Let us now see how this interpretation of the ὑποζώματα will apply to Plato's description of the universe. Er, the son of Armenius, is telling his experiences in the world after death, and going on to tell about his vision of the heavens says (*Resp.* 616 B, ff.): 'From here they saw stretching from above through the whole heavens and the earth, a straight light, like unto a pillar, bearing most resemblance to the rainbow, but brighter and purer. This they reached after a day's journey, and there saw at the middle of the light, *its* ends hung upon the sky, stretched from their fastenings—for this light was the bond holding together the heavens, just as the undergirders of the triremes, so holding together their whole periphery.'

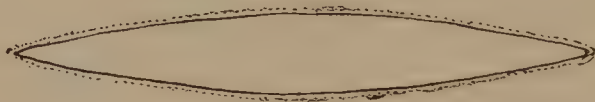
Adam, in his most valuable edition of the *Republic*, uses the following diagram to explain the passage:



making the column of light the axis of the heavenly sphere, but extending it *through* the poles and *around the outer shell of the sphere*, thinking that this bounding and containing of the universe is the resemblance Plato would have us bear in mind to the undergirders of triremes. But is it not hard to think of this column of light as parting at the poles into two strands, and these to be bent around opposite sides of the sphere? If we take simply the diameter of the sphere as our ὑπόζωμα, we shall have only the pillar of light to deal with, a proposition far simpler if we regard this as the axis of the universe. The construction and relation to each other of the various phrases in the sentence καὶ ἰδεῖν [ἔφη] αὐτόθι κατὰ μέσον τὸ φῶς ἐκ τοῦ οὐρανοῦ τὰ ἄκρα αὐτοῦ τῶν δεσμῶν τεταμένα, are by no means clear, and they can be construed in various ways. As I take it, αὐτοῦ refers to φῶς, the ἄκρα of the column or girder being fastened by special binding-places (δεσμοί) to the heavens, and extending from them (ἐκ τοῦ οὐρανοῦ). Then too, the σύνδεσμον of the following clause would be as truly a bond holding together the

sphere if it were stretched across the inside of it, as it would if made to encircle and so contain the whole. This is the conception of Plato as it appears to me, and I have tried to make it conform with what can be ascertained about the *ὑποζώματα* of the ancient trireme.

I have said nothing about what I feel certain came in later times to be called *ὑποζώματα*, and which existed long before, but not, I think, under that name. They appear on a few ancient reliefs apparently as ornaments. I mean the ropes stretched longitudinally from prow to stern, above, below, or at the water line. Boeckh has tried to show that this was the only kind of *ὑπόζωμα* in use, and Adam, not ready to deny it, admits that there may have been two kinds. Certainly this variety is referred to by later Greek and by Roman writers (cf. Vitruvius 10, 15, 16), but that such cables could have been used to strengthen a ship and to make it more seaworthy, as we have seen the *ὑπόζωμα* was used, is, I think, impossible. Assuming roughly the dimensions of a trireme to have been 100 feet \times 15 feet (a very conservative estimate, since some of the remains of the Harbor of Zea show that many of the ships must have been 150 feet \times 20 feet, thus giving a proportionally greater length¹), if we stretched a cable longitudinally around the hull of such a vessel, no matter how tightly drawn, there would be no appreciable pressure exerted on the sides to give the planking any support, because the curve of the cable would be so slight as to approximate a straight line.



Such *ὑποζώματα* are shown on various extant sculptures, but I believe they are to be regarded as no more than ornaments. As for the definition found in Isidorus (*Orig.* 19, 4, 4) *Tormentum: funis in navibus longus qui a prora ad puppim extenditur ut magis constringantur*, it cannot be said that the *ὑπόζωμα* is referred to at all, because the description will apply just as well to the tall hogging frames used on the Egyptian ships. It is from my belief that the name *ὑπόζωμα* was

¹ See Torr, *Ancient Ships*, p. 22.

later applied to these longitudinal girders, that I omitted from my principal discussion a consideration of the Latin passages, and Athenaeus' use of the word in this sense (p. 204, A). It may well have been that these cables served as fenders for the ship, just as on modern vessels an iron-sheathed binding or rim often extends half a foot or thereabouts from the side, at about the height of the dock.

DOCTOR DISSERTATIONS, 1910-11

HENRY WHEATLAND LITCHFIELD. — *Quibus virtutum vitiorumque moralium exemplis ex suorum annalibus sumptis scriptores Latini antiqui usi sint.*

THE discussion, dealing with the Romans' practice of citing personalities derived from their national history as *exempla* illustrative of the moral virtues and vices, is based upon an examination of the use of such *exempla* in Latin literature through Claudian, with some reference to later Latin and to Greek literature. After a preliminary statement of the place of the *exemplum* in Roman ethics and a discrimination of the evidence obtained, a selection of *exempla maiora* is made with regard in each instance as well to the combined weight as to the number of the respective citations. The *maiora* are then taken up chronologically at length, in so far as each presents any novelty of type or is of less immediately evident importance; they are: Romulus, L. Brutus, Lucretia, Cocles, Scaevola, Cloelia, Cincinnatus, Camillus, Curtius, Torquatus, Decii, Dentatus, Fabricius, Regulus, Serranus, Cunctator,¹ Hannibal, Africanus,¹ Claudia,¹ Catones,¹ Marius, Sulla, Catilina,¹ Pompeius, Iulius. Each full discussion includes a statement of the achievements of the given *exemplum*, his typical attributes, the development of his legend among both Romans and Christians, and — usually in conclusion — a complete and chronologically arranged index of passages as well illustrative as affording direct evidence of exemplary citation.

In general, it is pointed out that the *maiora* are without exception the authors of some signal service or injury to the Roman state: the patriotic motive thus evinced is illustrated by pronouncements of Roman ethical writers, and a contrast with Greek practice is suggested. A memorandum of the cases in which men of the imperial period, both private citizens and emperors — notably Augustus, are named as belonging to the *exempla*, shows that even the *minora* are almost exclusively ante-imperial: among the influences which led to the closing of what is,

¹ Discussed summarily.

therefore, virtually an exemplary canon are suggested the motive of the "golden age," subserviency to the reigning emperor, in the case of emperors — possibly — the divinity to them ascribed, and above all, in general, deference to the precedent of great writers like Cicero and Virgil rather than of books of *exempla*: an enumeration of which reveals none devoted specifically to the class of *exempla* here treated. The position of representative Latin writers with regard to the development of the canon is briefly considered. An alphabetical list of the *minora* is added.

DWIGHT NELSON ROBINSON. — *Quibus temporibus religiones ab Oriente ortae et Romae et in provinciis Romanis floruerint desierintque quaestiones.*

THE purposes of this dissertation are first, to fix in detail, as definitely as our data will allow, the period during which the Oriental cults were rising into prominence in the western part of the Graeco-Roman world, the era of their greatest popularity, and the time of their decay; secondly, to determine the causes of their decadence.

The field covered by these investigations comprises the whole western portion of the Roman world. The sources of information, though partly literary, are in the main epigraphical.

A survey of this material reveals the fact that a sharp cleavage exists between the situation in Rome and that in the provinces. Rome made her acquaintance with the Oriental cults in 205 B.C. and from that time on never ceased to be connected more or less intimately with them. Literary evidences for the cults during the first century of our era are fairly numerous, but inscriptional evidence does not begin to be common until about 100 A.D. From that time on the inscriptions continue until the beginning of the fifth century, being peculiarly rich and instructive during the period of the last great Pagan revival in the fourth century.

In the provinces, however, an entirely different situation manifests itself. The datable evidence relating to the Oriental cults begins to appear about 100 A.D. and from that time on we find it continuously until 250 A.D., after which date it is almost impossible to find dedications to Oriental gods in the provinces. There are, of course, sporadic exceptions to this general rule, but even in these cases one often finds

that the inscription is due to outside influences and does not reflect the true religious condition of the province.

We see then that the Oriental cults began to be popular in the first century of the Christian era, attained the height of their influence in the third century, and thereafter soon lost their hold in the provinces; in Rome, however, the Pagan revival kept them in favor until the end of the fourth century. It is worthy of notice in this connection that the dedicants at Rome during the fourth century belong chiefly to the nobility, as contrasted with the lower social status of the dedicants in the provinces.

The chief causes of the decadence of the Oriental cults are three : I. The fact that the Oriental cults had probably fulfilled their mission and gradually lost their hold on their devotees; II. the rapid spread of the Christian Faith during the third century; III. the invasions of the barbarians. The operation of these causes varied naturally in the several provinces.

There are appended to the body of the dissertation chronological tables, containing lists of the datable inscriptions dealing with the Oriental cults, arranged according to districts and divinities.

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